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**Index  
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NASA Tech Briefs  
1971**



February 1972

National Aeronautics and Space Administration

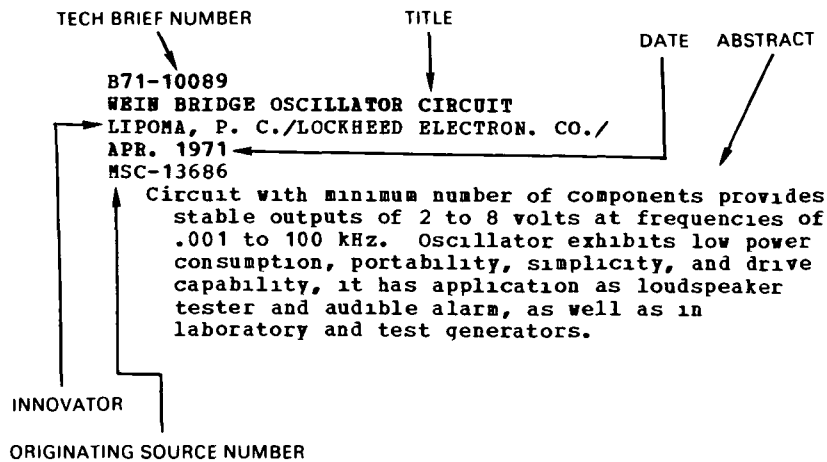
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# Introduction

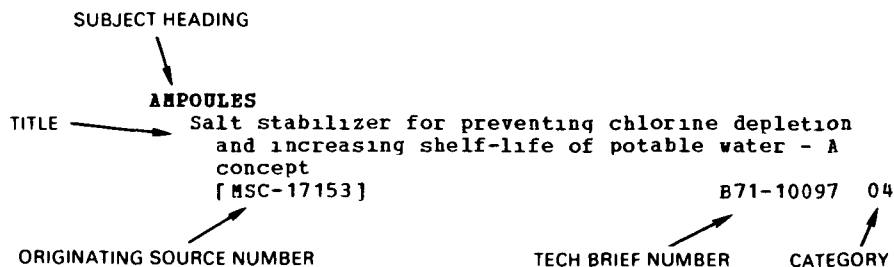
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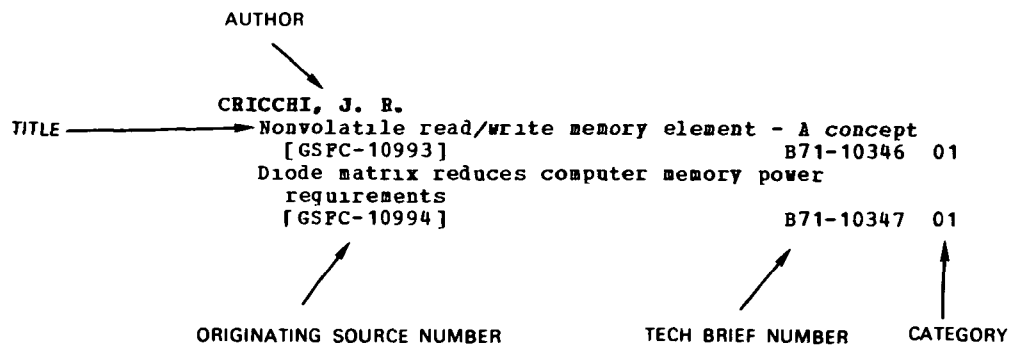


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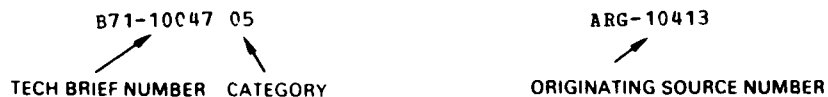
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# 01 ELECTRONICS/ELECTRICAL

**B71-10011**  
**UNIVERSAL INTERFACE ENABLES ONE RECORDER TO SERVE**  
**NUMEROUS MEASURING INSTRUMENTS**  
 DONLIN, N. E./BOEING CO./  
 JAN. 1971  
 M-FS-15134  
 Circuit handles data, regardless of polarity and amplitude, in 10-line decimal form or in any form of binary coded decimal. When measuring instruments have common chassis grounds, Zener diodes prevent low-leak circulating currents from unbalancing the circuit.

**B71-10013**  
**SATURABLE-REACTOR MOTOR STARTER REDUCES LINE VOLTAGE**  
**FLUCTUATIONS**  
 CURRIE, N. G./N. AM. ROCKWELL CORP./  
 JAN. 1971  
 M-FS-18921  
 Saturable reactor starter uses back electromotive force /emf/ generated by large motors /18,650 to 596,800 watts/ to limit and control the starting current.

**B71-10014**  
**AUTOMATIC REFERENCE LEVEL CONTROL FOR AN ANTENNA**  
**PATTERN RECORDING SYSTEM**  
 LIPIN, R., JR./SPERRY RAND CORP./  
 JAN. 1971  
 M-FS-20257  
 Automatic gain control system keeps recorder reference levels within 0.2 decibels during operation. System reduces recorder drift during antenna radiation distribution determinations over an eight hour period.

**B71-10016**  
**ELECTROMAGNETIC SIMULATION OF MICROWAVE BACKSCATTER**  
**FROM THE OCEAN SURFACE - A FEASIBILITY STUDY**  
 WARD, R. B./LOCKHEED MISSILES AND SPACE CO./  
 JAN. 1971 SEE ALSO NASA-CR-98454  
 M-FS-20476  
 Photochemical etching is most successful method for obtaining simulated microwave backscatter pattern from ocean surface. Process is adaptable to integrated circuit and thin film semiconductor fabrications. The attained horizontal resolution of 10 should improve with equipment refinement.

**B71-10021**  
**STUDY OF SECOND BREAKDOWN IN POWER TRANSISTORS USING**  
**INFRARED TECHNIQUES**  
 INNOVATOR NOT GIVEN /RAYTHEON CO./ JAN. 1971  
 M-FS-20748  
 Infrared thermal maps pinpoint exact location where second breakdown will occur before phenomenon happens and before physical damage develops at hot spot. Crystal structure analysis at that point determines cause of fault. Absolute power of radiation emitted from hot spot is direct indication of voltage level at which second breakdown occurs

**B71-10025**  
**RADIAL ROTATING ANTENNA-FEED SYSTEM**  
 DODD, L. R. KELLER, G. C. MAXWELL, M. S.  
 FEB. 1971  
 GSPC-11013  
 System incorporating two or more radial feed assemblies tracks and communicates with multiple moving transmitters, receivers, or transponders. System utilizes a fixed parabolic reflector or other beam-forming device such as a lens or spherical reflector.

**B71-10029**  
**LONG-LIFE ELECTROMECHANICAL SINE-COSINE GENERATOR**  
 FLAGGE, B.  
 MAR. 1971  
 LANGLEY-10503  
 Sine-cosine generator with no sliding parts is capable of withstanding a 20 Hz oscillation for

more than 14 hours. Tests show that generator is electrically equal to potentiometer and that it has excellent dynamic characteristics. Generator shows promise of higher-speed applications than was previously possible.

**B71-10032**  
**CONDUCTIVE ELASTOMERIC EXTENSOMETER**  
 GAUSE, P. L. GLENN, C. G.  
 FEB. 1971  
 M-FS-21049  
 Bridge circuit, in which conductive elastomeric material is the variable leg, precisely measures surface area changes in the human body. Circuits are used singularly, or in quantity by adding elements and amplifier circuits. Elastomeric strips can be located in a form-fitting garment.

**B71-10033**  
**WIDE-ANGLE, CIRCULARLY POLARIZED,**  
**OMNIDIRECTIONAL-ARRAY ANTENNA**  
 BOYER, R. B./RADIATION, INC./ CASE, E. W. ROSA, J.  
 FEB. 1971  
 GSPC-10928  
 Modified conventional turnstile antenna features bifoliate pattern with relatively high gain and good circularity over solid area enclosed by the 0.26 and 1.31 radian angles of elevation. These antennas are intended for high altitude balloon use, their permissible weight is restricted to one pound.

**B71-10035**  
**IMPROVED METHODS OF FORMING MONOLITHIC INTEGRATED**  
**CIRCUITS HAVING COMPLEMENTARY BIPOLAR TRANSISTORS**  
 BOHANNON, R. O., JR./TEX. INSTR. CORP./ CASHION, W. P.  
 STEHLIN, R. A.  
 FEB. 1971  
 LANGLEY-10358  
 Two new processes form complementary transistors in monolithic semiconductor circuits, require fewer steps /infusions/ than previous methods, and eliminate such problems as nonuniform h sub PE distribution, low yield, and large device formation.

**B71-10040**  
**ACTIVE PARALLEL REDUNDANCY FOR ELECTRONIC**  
**INTEGRATOR-TYPE CONTROL CIRCUITS**  
 PETERSON, R. A./WESTINGHOUSE ASTRONUCL. LAB./  
 FEB. 1971  
 NUC-10231  
 Circuit extends concept of redundant feedback control from type-0 to type-1 control systems. Inactive channels are slaves to the active channel, if latter fails, it is rejected and slave channel is activated. High reliability and elimination of single-component catastrophic failure are important in closed-loop control systems.

**B71-10043**  
**INEXPENSIVE SYSTEM PROTECTS MEGAWATT**  
**RESISTANCE-HEATING FURNACE AGAINST HIGH-VOLTAGE SURGES**  
 STEARNS, E. J./WESTINGHOUSE ASTRONUCL. LAB./  
 MAR. 1971  
 NUC-10239  
 Coolant gas extinguishes arcing across the break in a heater element. Air-gap shunt which bypasses high voltage impressed across the circuit prevents damage if the resistance elements break and open the inductive circuit.

**B71-10069**  
**DUAL-CHANNEL CIRCUIT CONDITIONS/AMPLIFIES TRANSDUCERS'**  
**INPUTS AND OUTPUTS**  
 MURPHY, K. M./N. AM. ROCKWELL CORP./  
 APR. 1971  
 MSC-15712  
 Circuit includes two data channels and one shared precision power supply installed on a single 11.4 cm square circuit card. The unit is relatively inexpensive, compact, and suitable for most tests where low-noise and high-gain signal processing is required.

**B71-10071**  
**SUBMERSED SENSING ELECTRODE USED IN FUEL-CELL TYPE**  
**HYDROGEN DETECTOR**

B71-10075

NIEDRACH, L. W./GE/ RUDEK, F. P. RUTKONESKI, H. D.  
APR. 1971  
N-PS-14655

Electrode has silicone rubber diffusion barrier with fixed permeation constant for hydrogen. Barrier controls flow of hydrogen to anode and Faraday relationship establishes upper limit for current through cell. Electrode fabrication is described.

B71-10075

MICROWAVE DOSIMETER - A CONCEPT  
BARTLETT, R./ALLIED RES. ASSOCIATES, INC./ BIRD, F.  
APR. 1971  
HQ-10407

Dosimeter determines time-integrated radiation dosage to which an individual is exposed. Integration is measured chemically in proportion to radiation detected. Wearer receives an exposure measurement representing an average of the dose over the entire body.

B71-10084

CERAMIC WIRING BOARD INCREASES PACKAGING DENSITY OF ELECTRONIC MODULES  
HANLEY, L. D./MIT/ MARTIN, J. H.  
APR. 1971  
MSC-13497

Ceramic multilayer wiring board interconnects large scale integration /LSI/ modules which dissipate nearly 2W/cc. Extremely high packaging density is possible by application of alumina cover hermetically sealed to board. Signal interconnections are completely dependent on transfer heat between layers.

B71-10088

HIGH DENSITY ELECTRONIC PACKAGING MODULE WITH IMPROVED COOLING ASSEMBLY  
MARTIN, J. H./MIT/  
APR. 1971  
MSC-13639

Cold plate increases heat transfer within high density electronic module. Tapered pins improve heat transfer process by providing larger surface pressure with increased planar area. Cooling technique increases thermal contact where planar area is limited, interface pressure increases the heat transfer coefficient.

B71-10089

WEIN BRIDGE OSCILLATOR CIRCUIT  
LIPOMA, P. C./LOCKHEED ELECTRON. CO./  
APR. 1971  
MSC-13686

Circuit with minimum number of components provides stable outputs of 2 to 8 volts at frequencies of .001 to 100 kHz. Oscillator exhibits low power consumption, portability, simplicity, and drive capability, it has application as loudspeaker tester and audible alarm, as well as in laboratory and test generators.

B71-10102

IMPROVED HIGH-TEMPERATURE METAL-SHEATHED CABLES  
FOX, H. A., JR./AEROJET-GEN. CORP./  
MAY 1971  
NUC-10413

Process prevents moist air degradation of cables insulated with magnesium oxide. Electrical-grade silicone oil is polymerized by heat application to produce water repellant surface coating. Insulation treated with this oil repels moisture.

B71-10114

SUBMINIATURE TRANSDUCER MEASURES UNSTEADY PRESSURES  
RAHAN, K. R.  
MAY 1971  
ARC-10349

Transducer has thin piezoelectric sensing element of 0.051-cm-thick lead zirconate titanate crystal which is cut as a conical frustum. Sensing crystal and titanium wire are protected from mechanical shock and vibration. Transducer is insensitive to mechanical vibrations of instrument plug on which it is mounted.

B71-10121

LOW-COST QUASI-PARABOLIC ANTENNA

TAGGART, R. B., JR./STANFORD UNIV./  
MAY 1971 SEE ALSO NASA-CR-72773  
LEWIS-11291

Antenna design employs flat petal-shaped aluminum sheets and novel rim configuration. New antenna is inexpensive and has only slightly degraded performance. Design advantages are low-cost tooling and fabrication, convenient size and shape for transport and assembly, and simple assembly procedure.

B71-10125

SELF-REPLACEABLE THERMOCOUPLE FOR MOLTEN STEEL BATH - A CONCEPT  
BLAU, P./WESTINGHOUSE ASTRONUCL. LAB./ ZELLNER, G.  
MAY 1971 SEE ALSO B66-10461  
NUC-10223

Thermocouple wires, consisting of tungsten-rhenium alloy protected by ablative ceramic coating, are wound on a reel and fed continuously into bath. Tests indicate accuracy and reliability are comparable to conventional devices.

B71-10128

HIGH CURRENT COMPENSATION NETWORK FOR DC LOGARITHMIC AMPLIFIERS  
WILSON, J. H./WESTINGHOUSE ASTRONUCL. LAB./  
MAY 1971  
NUC-10148

Circuit voltage output is reduced by voltage equivalent to ampere resistance drop of nonlogarithmic resistances of practical diodes; therefore, output is same as circuit using ideal diode. Circuit applies to meter and electronic recorder movements, and improves performance of radiation detectors and several microbiological monitoring devices

B71-10132

HYBRID REDUNDANCY SYSTEM FOR IMPROVING RELIABILITY - A CONCEPT  
MATHUR, F. P.  
MAY 1971 SEE ALSO JPL-TR-32-1467  
NPO-11546

System combines two concepts - triple modular redundancy (TMR) and spares (replacement system) redundancy. System has triplicated active unit core with associated bank of specifically arranged standby spare units. Curves plotted from characteristic equation show hybrid system is more reliable than conventional TMR systems.

B71-10136

HIGH VOLTAGE LIGHTNING GROUNDING DEVICE  
HOFFMAN, R. G. PETERSON, V. S.  
MAY 1971  
LEWIS-11282

Grounding device insertion in wire termination cabinets and terminal block modification prevent lightning-induced high voltage transients from reaching inputs or outputs of solid state instruments and control systems. Installation minimizes wiring confusion and achieves 100 percent protection.

B71-10142

SATURATION CURRENT SPIKES ELIMINATED IN SATURABLE CORE TRANSFORMERS  
SCHWARZ, F. C.  
MAY 1971  
ERC-10125

Unsaturating composite magnetic core transformer, consisting of two separate parallel cores designed so impending core saturation causes signal generation, terminates high current spike in converter primary circuit. Simplified waveform, demonstrates transformer effectiveness in eliminating current spikes.

B71-10162

DESIGN OF HYSTERESIS CIRCUITS USING DIFFERENTIAL AMPLIFIERS  
COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./  
JUN. 1971  
ARC-10070

Design equations for hysteresis circuit are based on the following assumptions: amplifier input impedance is larger than source impedance; amplifier output impedance is less than load

impedance; and amplifier switches state when differential input voltage is approximately zero. Circuits are designed to any given specifications.

**B71-10170**  
**ELECTRONIC RIPPLE INDICATOR**  
 DAVIDSON, J. K. BOUCK, W. H.  
 JUN. 1971  
 KSC-10162

Electronic circuit for monitoring excessive ripple voltage on dc power lines senses voltage variations from few millivolts to maximum of 10 volts rms. Instrument is used wherever power supply fluctuations might endanger system operations or damage equipment. Device is inexpensive and easily packaged in small chassis.

**B71-10171**  
**VOLTAGE-CONTROLLED OSCILLATOR**  
 DURAND, J. L./SYSTEMS TECHNOL., INC./  
 JUN. 1971  
 ARC-10078

Oscillator generates symmetrical triangular waveform when inverting and noninverting inputs are equal. Oscillator portion of circuit has integrated circuit, high-performance operational amplifier wired as differential integrator, and two silicon controlled rectifiers.

**B71-10174**  
**A 20 KHZ POWER OSCILLATOR**  
 STURMAN, J. C.  
 JUN. 1971  
 LEWIS-11319

Circuit providing stable sine wave power up to 10 W supplies small amounts of power at frequency other than 60 Hz. Circuit has Wien bridge oscillator which uses operational amplifier to feed power amplifier stage. Power amplifier stage uses booster amplifier and two discrete transistors for power output.

**B71-10177**  
**MULTILOOP DISTRIBUTED RC ACTIVE NETWORKS**  
 KERWIN, W. J.  
 JUN. 1971  
 ARC-10200

Distributed RC active two-port network and voltage amplifier provides advantage over lumped elements in that second-order bandpass function is obtained with single distributed passive element. Incorporating positive and negative feedback loops provides improvement in Q, sensitivity, and gain-Q sensitivity product compared to single-loop networks.

**B71-10179**  
**IMPROVED SHEATH REMOVAL TECHNIQUE FOR VERY SMALL THERMOCOUPLES**  
 MUELLER, R.  
 JUN. 1971  
 LEWIS-11228

Standard "weldmatic" spotwelder and tweezer-type welding head burns and vaporizes sheath material to expose undamaged thermocouple wire. Firing is repeated to remove additional sheathing and after three or four firings electrodes require cleaning.

**B71-10182**  
**DETERMINATION OF NONLINEAR RESISTANCE VOLTAGE-CURRENT RELATIONSHIPS BY MEASURING HARMONICS**  
 STAFFORD, J. M./IBM CORP./  
 JUN. 1971  
 M-PS-20402

Test configuration measures harmonic signal amplitudes generated in nonlinear resistance. Vacuum-type voltmeter measures low frequency sinusoidal input signal amplitude and wave-analyzer measures amplitude of harmonic signals generated in junction. Input signal harmonics amplitude must not exceed that of harmonics generated in nonlinear resistance.

**B71-10190**  
**INEXPENSIVE, LARGE-DIAMETER, RADAR TRACKING AND CALIBRATION SPHERES**  
 HOLDREN, R. H.

**JUN. 1971**  
**XLA-11154**

Plastic models of polystyrene beads are produced to within 0.02 cm accuracy, in various diameters designed to meet exact requirements of particular radar system frequency spectrum. They are inexpensive and do not require special handling imposed on metal spheres.

**B71-10193**  
**SMALL SIZE TRANSFORMER PROVIDES HIGH POWER REGULATION WITH LOW RIPPLE AND MAXIMUM CONTROL**  
 MANOLI, R./N. AM. ROCKWELL CORP./ ULRICH, B. R.  
 JUN. 1971  
 M-PS-16709

Single, variable, transformer/choke device does work of several. Technique reduces drawer assembly physical size and design and manufacturing cost. Device provides power, voltage current and impedance regulation while maintaining maximum control of linearity and ensuring extremely low ripple. Nulling is controlled to very fine degree.

**B71-10201**  
**AN IMPROVED TELEMETRY SYSTEM**  
 LUMB, D. R.  
 JUN. 1971 SEE ALSO NASA-TN-D-4105, NASA-TN-D-4402  
 ARC-10336

Transmission of parity bits together with data bits by a rate one half convolutional code of 25-bit constraint length, with sequential decoding of received signal increases quantity and accuracy of data transmitted by pulse code modulated system operating at given power level.

**B71-10204**  
**COARSE ROLL-RATE GAIN-CONTROL CIRCUIT**  
 COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./  
 JUN. 1971  
 ARC-10064

Circuit is used in spin-rate computing unit of control system for solar pointing rocket during its acquisition mode. Direction cosines from magnetometers and coarse sun sensors derive function that is approximately roll-rate times sum of absolute value of direction cosines.

**B71-10221**  
**AUTOMATIC CROSS-SECTIONING AND MONITORING SYSTEM LOCATES DEFECTS IN ELECTRONIC DEVICES**  
 JACOBS, G./SPERRY RAND/ SLAUGHTER, B.  
 JUL. 1971  
 GSFC-11221

System consists of motorized grinding and lapping apparatus, sample holder, and electronic control circuit. Low power microscope examines device to pinpoint location of circuit defect, and monitor displays output signal when defect is located exactly.

**B71-10231**  
**ELECTROLYSIS CELL FUNCTIONS AS WATER VAPOR DEHUMIDIFIER AND OXYGEN GENERATOR**  
 CLIFFORD, J. E./BATTELLE MEM. INST./  
 JUL. 1971 SEE ALSO NASA-CR-771, NASA-CR-73170  
 ARC-10316

Water vapor is absorbed in hygroscopic electrolyte, and oxygen generated by absorbed water electrolysis at anode is added simultaneously to air stream. Cell applications include on-board aircraft oxygen systems, portable oxygen generators, oxygen concentration requirements, and commercial air conditioning and dehumidifying systems.

**B71-10234**  
**CATHETER TRANSDUCER AND CIRCUIT**  
 HARRISON, D. R./KERWIN, W. J.  
 JUL. 1971 SEE ALSO B67-10669  
 ARC-10132

Simple integrated circuit located at transducer, enables use of single coaxial cable for both input and output connections. Circuit is sensitive to changes in RC time constant, has much improved sensitivity characteristics, and is unaffected by changes in cable capacitance effects.

B71-10242

B71-10242  
FLAT-CONDUCTOR CABLE HAS ROTARY AND LINEAR FLEXIBILITY  
CARDEN, J. R.  
JUL. 1971 SEE ALSO NASA-TN-X-53960  
M-FS-21096

Report describes capabilities and limitations of flat-conductor cable /FCC/ relative to flexure in bending, folding, rotating, and extending, it also compares FCC mechanical and endurance characteristics with round-wire cable, and compares qualities of various types of insulation for FCC. Several configurations exemplify FCC flexibility.

B71-10274  
FAST CARRY ACCUMULATOR DESIGN  
MASTIN, W. C./ASTRIONICS LAB./  
AUG. 1971 SEE ALSO NASA-TN-X-53983  
M-FS-20902

Simple iterative accumulator combined with gated-carry, carry-completion detection, and skip-carry circuits produces three accumulators with decreased carry propagation times. Devices are used in machine control, measurement equipment, and computer applications to increase speed of binary addition. MAND gates are used in combining network.

B71-10275  
OSCILLATING TANK CIRCUIT ELIMINATES BALLAST RESISTOR IN LAMP CONTROL CIRCUIT  
LISTER, L. R./SPERRY RAND/  
AUG. 1971  
M-FS-20891

Circuit limits lamp current, replacing the series current-limiting resistor.

B71-10279  
ISOSCELES DETECTOR PROVIDES MAXIMUM RESOLUTION IN EXPANDED RANGE  
WATTERSON, R. P./SANDERS ASSOCIATES, INC./  
AUG. 1971  
GSPC-10932

Dynamic range expansion system for radio frequency /RF/ signal detection equipment consists of RF amplifiers, RF amplitude modulated detectors, and operational amplifier. The analog output gives maximum resolution over fixed voltage range, without switching. Two minor drawbacks of this circuit are cited.

B71-10286  
OSCILLATOR WITH WIDE DYNAMIC TUNING RANGE  
RIPPY, R. R.  
AUG. 1971  
GSPC-11086

Two or more tandem amplifier stages, one of which is tuned, added to a circuit permit tuning an oscillator over frequency range of six decades. Oscillator operates in distributed mode for increased frequency stability. Within practical limitations, stability increases by increasing number of tuned stages.

B71-10287  
ENHANCING EFFICIENCY OF SINGLE, LARGE-APERTURE ANTENNAS  
COHEN, M./ADVANCED TECHNOLOGICAL CORP./ GRIMES, D. E.  
LITTLEPAGE, R. S.  
AUG. 1971 SEE ALSO NASA-CR-101352  
HQ-10597

Numerical analysis method provides means of describing energy distribution in focal plane of parabolic surface in terms of phase and wavelength. Two approaches for enhancing antenna efficiency include single, large reflector focused to feeding element, and array of smaller apertures whose individual outputs are summed.

B71-10292  
IMPROVED RELAY CHATTER DETECTOR  
REYNOLDS, R. K.  
AUG. 1971  
NPO-10355

Detector provides go/no-go sensing of momentary relay or contact opening during vibration testing. Device compares duration of unwanted openings to calibrated standard and lights indicator if standard is exceeded. Stability and

reliability are higher than in any other comparable device.

B71-10304  
A CONTINUED FRACTION GENERATOR FOR SMOOTH PULSE SEQUENCES  
COHN, M./SPERRY RAND/ EVEN, S. LINCOLN, S. J.  
AUG. 1971  
MSC-13697

Digital circuit produces rational output pulse rate at fraction of continuous input pulse rate. Output pulses have average rate with least possible deviation from absolute correct time spacing. Circuit uses include frequency synthesizing, fraction generation, and approximation of irrational sequences.

B71-10309  
CALIBRATION-INTERNAL ADJUSTMENT INDICATOR - A CONCEPT  
HEDENE, P. S./N. AM. ROCKWELL CORP./  
AUG. 1971  
M-FS-18693

Circuit, when used with decision table, permits relatively unskilled personnel to maintain effective quality control. Design determines required changes in calibration intervals. Interval readings are recorded to nearest integer, making high precision unnecessary. Specific required performance-history information is discussed.

B71-10313  
MICROWAVE BIASING IMPROVES DETECTOR RESPONSE IN THE INFRARED REGION  
SUN, C./RCA/ WALSH, T. E.  
AUG. 1971  
GSPC-11050

Detection system, which incorporates advantages of microwave biasing, measures output of a carbon dioxide laser at 10.6 microns with a factor of 1,000 improvement in sensitivity. Material lifetime, rather than external circuitry, limits detector response time.

B71-10322  
NOVEL SHIFT REGISTER ELIMINATES LOGIC GATES AND POWER SWITCHING CIRCUITS  
CLIFF, R. A.  
AUG. 1971  
GSPC-10517

Register requiring two integrated circuits per stage has nominal power dissipation of 3.5 mW per stage, its use eliminates reset pulse, allowing data transfer to occur in less than 1 microsecond, and eliminates power application to both right and left portions of the register simultaneously.

B71-10323  
PRESSURE TRANSDUCER WITH FOUR-DECADE DYNAMIC RANGE  
INNOVATOR NOT GIVEN /BOEING CO./ AUG. 1971  
KSC-10384

Adjustable resistor taps in gain-control feedback loop of the transducer permit wide sensing range, shorting the pins on electrical connector allows selection of appropriate range. Electrical specifications of the transducer and its applications are cited.

B71-10334  
ION IMPLANTATION REDUCES RADIATION SENSITIVITY OF METAL OXIDE SILICON /MOS/ DEVICES  
INNOVATOR NOT GIVEN /RES. TRIANGLE INST./ SEP. 1971  
SEE ALSO NASA-CR-1584  
LANGLLEY-10630

Implanting nitrogen ions improves hardening of silicon oxides 30 percent to 60 percent against ionizing radiation effects. Process reduces sensitivity, but retains stability normally shown by interfaces between silicon and thermally grown oxides.

B71-10341  
PICTORIAL DISPLAY OF MATERIALS AND PROCESSES AIDS IN FABRICATING COMPLEX ASSEMBLIES  
EHRET, R. M./N. AM. ROCKWELL CORP./ FAWKES, G. J.  
SEP. 1971  
M-FS-24006

Method uses assembly consisting of single pictorial

display showing cutaway view of assembly, subassemblies identified by name and materials, and processes identified by both specification and commercial design. Display is used in engineering, manufacturing, and personnel training.

B71-10345  
DIGITAL DECODER FOR PHASE-DELAY CODED DATA  
LEWIN, J./RCA/  
SEP. 1971  
GSFC-10894

Coded or modulated digital data converts to nonreturn to zero /NRZ/ data. Technique includes logic implementation and pertinent timing diagrams. Demodulation to NRZ facilitates digital logic operations on incoming data. Phase-delay modulation has advantage of inherent self-timing not present in NRZ modulation.

B71-10346  
NONVOLATILE READ/WRITE MEMORY ELEMENT - A CONCEPT  
CRICCHI, J. R./WESTINGHOUSE ELEC. CORP./ LITTLE, W. J.  
SEP. 1971 SEE ALSO NASA-CR-106493  
GSFC-10993

Memory, with limited number of programming cycles, is achieved by using verticle, fusible links in series with oxide breakthrough elements. Memory elements are fabricated with integrated circuit technology and are ideal for low power digital computer application.

B71-10347  
DIODE MATRIX REDUCES COMPUTER MEMORY POWER REQUIREMENTS  
CRICCHI, J. R./WESTINGHOUSE ELEC. CORP./  
SEP. 1971 SEE ALSO NASA-CR-106493  
GSFC-10994

Bidirectional MOS driver, integrated with diode matrix reduces fuse read current to only that of junction leakage and transient MOS gate charging current. No current, except junction leakage current, flows in unaddressed cells. Current required to drive MOS gate flows through unfused branch only during read mode.

B71-10349  
DOUBLE PHASE-LOCK LOOP WITH RAPID TRANSIENT RESPONSE A CONCEPT  
BALCEWICZ, J. F./RCA/  
SEP. 1971  
GSFC-10864

Integration loop, with narrow bandwidth and long response time, integrates phase estimate of sampling loop, resulting in slower but less jittery response to phase step changes. Sampling loop has wide bandwidth and quick response to phase steps of burst sync interval.

B71-10361  
SYSTEMS MANAGEMENT TECHNIQUES AND PROBLEMS  
INNOVATOR NOT GIVEN /NASA. MARSHALL SPACE FLIGHT CENTER/ SEP. 1971  
M-PS-21401

Report is reviewed which discusses history and trends of systems management, its basic principles, and nature of problems that lend themselves to systems approach. Report discusses systems engineering as applied to weapons acquisition, ecology, patient monitoring, and retail merchandise operations.

B71-10365  
DISCRETE-COMPONENT S-BAND POWER AMPLIFIER  
LINE, L. G. RIPPY, R. R.  
SEP. 1971  
GSFC-11248

Amplifier uses low Q input and output circuitry incorporating four variable air dielectric capacitors. Performance over conventional designs includes - increased power output, decreased likelihood of parametric oscillation, and increased thermal stability.

B71-10367  
VOLTAGE REGULATOR DISSIPATES MINIMAL POWER AND FUNCTIONS AS A VOLTAGE DIVIDER  
HESTER, H. B.  
SEP. 1971  
Regulator requires minimum amount of power for voltage division and it is not required

continuously. The only power loss, except for regulating purposes, is that needed to provide for imbalances in load current requirements. For balanced loads, only leakage current flows through regulating transistors.

B71-10368  
SILICON CONTACT FOR AREA REDUCTION OF INTEGRATED CIRCUITS  
LIN, H. C.  
SEP. 1971  
M-PS-20688

Semiconductor contact is used in place of metal contact forming a low leakage junction with the background material even if misalignment occurs.

B71-10379  
FLAT CONDUCTOR CABLE HANDBOOK  
ANGELE, W. HANKINS, J. D.  
OCT. 1971 SEE ALSO NASA-SP-5043, NASA-SP-5924/01/  
NASA-TN-X-53975  
M-PS-21009

Handbook includes discussion of FCC advantages, status of FCC regarding military specifications, hardware availability, and existing applications, descriptions and data on available cable, connectors, fasteners and hardware, design techniques and applications, wiring, manufacturing and installation techniques - and inspection and test procedures.

B71-10380  
PROGRAM AUDIT A MANAGEMENT TOOL  
MILLER, T. J./BOEING CO./  
OCT. 1971  
RSC-10557

Program gives in-depth view of organizational performance at all levels of the management structure, and provides means by which managers can effectively and efficiently evaluate adequacy of management direction, policies, and procedures.

B71-10426  
RF-CONTROLLED IMPLANTABLE SOLID STATE SWITCH  
FRYER, T. B.  
NOV. 1971  
ARC-10136

Miniature, totally implantable, solid state RF-controlled switching circuit for biotelemetry systems consumes zero power in off condition and turns on or off by pulse of RF energy. Switch, the size of small coin, is reducible by integrated circuit techniques.

B71-10428  
CLOCKING CONNECTOR REPLACES ADAPTER CABLES  
ARRIOLA, S./N. AM. ROCKWELL CORP./ RASMUSSEN, R. A.  
NOV. 1971  
M-PS-14778

Single cable using simplified, versatile clocking connector satisfies clocking variations that previously required many cables. Connector consists of specially fabricated grommet follower dial housing, dial assembly and modified insert.

B71-10429  
WAVESHAPING ELECTRONIC CIRCUIT  
HARPER, T. P./IBM/  
NOV. 1971  
M-PS-14916

Circuit provides output signal with sinusoidal function in response to bipolar transition of input signal. Instantaneous transition shapes into linear rate of change and linear rate of change shapes into sinusoidal rate of change. Circuit contains only active components; therefore, compatibility with integrated circuit techniques is assured.

B71-10438  
RADIOGRAPHIC INSPECTION SPECIFICATIONS FOR ELECTRONIC COMPONENTS  
INNOVATOR NOT GIVEN /TRW, INC./ NOV. 1971  
M-PS-20723

Quality assurance provisions cover personnel training, radiographic equipment, radiographic test procedures, and inspection and examination of radiographs. Supplementary information includes accept and reject criteria for radiographic inspection of resistors, capacitors, transistors, hybrid microcircuits, diodes, small coils and transformers.

**B71-10450**

**B71-10450**  
**DIGITAL PARALLEL-TO-SERIES PULSE-TRAIN CONVERTER**  
 HUSSEY, J./GRUMMAN AEROSPACE CORP./  
 NOV. 1971  
 NSC-12417

Circuit converts number represented as two level signal on n-bit lines to series of pulses on one of two lines, depending on sign of number. Converter accepts parallel binary input data and produces number of output pulses equal to number represented by input data.

**B71-10452**  
**PRECISION, TRIPLE-PARAMETER, NONDESTRUCTIVE-TEST SYSTEM FOR IN-PROCESS MICROWELDING**  
 INNOVATOR NOT GIVEN /WALTER V. STERLING, INC./ NOV. 1971 SEE ALSO NASA-CR-73207, NASA-CR-73385  
 ARC-10402

System simultaneously and automatically monitors weld pulse voltage, dynamic setdown, and infrared radiation of weld as it is formed. Features of system include minimum complexity, measurement reliability, simple signaling, and no impediment to operator manipulations.

**B71-10469**  
**LOW-FREQUENCY TRIANGULAR WAVE GENERATOR**  
 THOMPSON, J. P./LOCKHEED MISSILES AND SPACE CO./  
 DEC. 1971  
 ARC-10259

Triangular waveform is generated by a combination of two integrated circuit operational amplifiers, one to produce square wave and other to integrate square wave and generate triangular wave.

**B71-10471**  
**CONTACT-RESISTANCE TEST PROBES- A] CONCEPT**  
 MAXWELL, J. H. MC DERMOTT, R. J.  
 BROOKS, C. H./H. AM. ROCKWELL CORP./  
 DEC. 1971  
 M-FS-16891

Devices are used in inspection of contact resistance in plated connectors after assembly into cables. System permits rapid inspection of connectors when mating connectors or special apparatus are not available, and enables source of excessive resistance to be precisely determined.

**B71-10486**  
**INSTRUMENT ACCURATELY MEASURES STRESS LOADS IN THREADED BOLTS**  
 ROLLINS, F. R., JR./MIDWEST RES. INST./  
 DEC. 1971 SEE ALSO NASA-CR-10292  
 M-FS-21121

Interferometric instrument response is linearly related to axial tensile stresses, and, under idealized conditions, measurement errors are within approximately plus or minus 1 percent. Ultimate accuracy of instrument depends on a number of variables, such as bolt material, dimensions, and geometry and uniformity of stresses and temperature.

**B71-10497**  
**PULSE WIDTH-PULSE RATE MODULATOR**  
 COOKE, W. A./LOCKHEED MISSILES AND SPACE CO./  
 DEC. 1971  
 ARC-10025

Attitude control system designed for rockets regulates duty cycle of pneumatic valves so less fuel is required. Operation time of each valve is directly proportional to error signal and the dead band about a null is controlled by independently adjustable threshold circuits.

**B71-10498**  
**WIDE-RANGE LOGARITHMIC RADIOMETER FOR MEASURING HIGH TEMPERATURES**  
 LISTON, E. M./STANFORD RES. INST./  
 DEC. 1971  
 ABC-10254

Filter radiometer utilizing photomultiplier circuit, in which a direct-coupled amplifier varies dynode voltage to maintain constant anode current, measures rapid variations of temperature of white-hot charred body at 2000 K to 3000 K.

**B71-10001**

**DIAGNOSTIC CAPABILITY ADDED TO DIGITAL EVENTS EVALUATOR**  
 FRASKETI, A. S./BOEING CO./ HANSON, G. E.  
 JAN. 1971  
 KSC-10526

Digital events evaluator reviews events preceding system malfunction and automatically prints out most probable cause of problem. Analysis is performed by comparing input data with nominal values stored in tables. Each table has associated system mask to restrict comparison to preselected critical parameters within a given system.

**B71-10019**  
**THERMAL AND STRUCTURAL MODELING OF SUPERINSULATION**  
 MARSHALL, K. H./LOCKHEED MISSILES AND SPACE CO./  
 MURRAY, D. O. ROLLING, R. E.  
 JAN. 1971 SEE ALSO NASA-CR-98241  
 M-FS-20324

Model permits direct physical measurement of the thermal response of critical components of space telescopes, thus providing flexibility for systems studies and design changes.

**B71-10049**  
**HIGH-SPEED DIGITAL PLOTTER**  
 GRAY, J., JR.  
 MAR. 1971  
 ABG-90001

Modified typewriter mechanism with standard logic components provides digital plot of output of multichannel analyzer. Unit plots irregular curves at approximately 14 channels per second, and smooth curves at over 25 channels per second, and is not subject to analog error or drift.

**B71-10056**  
**DUAL-FREQUENCY FRED-HORN ANTENNA**  
 SCHUCHARDT, J. M./MARTIN MARIETTA CORP./  
 MAR. 1971  
 GSPC-10820

Antenna with novel two-port diplexer separates high power /31.65 GHz/ transmitted signal from low power /15.2 GHz/ received signal. Two-port network feeds dual-frequency horn and excites antenna with minimal loss in power. Isolation between transmit port and receive port ranges from 60 db to 80 db.

**B71-10057**  
**ECONOMICAL PHASED-ARRAY ANTENNA FOR ENVIRONMENTAL APPLICATIONS**  
 HIGGINS, W. T./MIT/  
 MAR. 1971 SEE ALSO NASA-CR-101683  
 HQ-10434

Antenna system handles data acquisition and tracking, functions as a sensitive radio telescope, and serves as a radiometer in earth atmosphere investigations. Antenna's sensitivity permits resolution of solar disk quadrants in Doppler radar observations. Antenna also serves as a planetary radar device and link to commercial aircraft.

**B71-10064**  
**MINIATURE FUEL CELLS RELIEVE GAS PRESSURE IN SEALED BATTERIES**  
 FRANK, H. A./DOUGLAS AIRCRAFT CO./  
 APR. 1971 SEE ALSO NASA-CR-80339  
 XGS-11370

Miniature fuel cells within sealed silver zinc batteries consume evolved hydrogen and oxygen rapidly, preventing pressure rupturing. They do not significantly increase battery weight and they operate in all battery life phases. Complete gas pressure control requires two fuel cells during all phases of operation of silver zinc batteries.

**B71-10082**  
**DIGITAL TELEMETRY SYSTEM ELIMINATES DATA REDUNDANCY**  
 HYMER, R. L.  
 MAY 1971  
 MSC-12388

Floating aperture, zero-order predictor /ZOP/ circuit eliminates telemetered data redundancy by examining data from each sensor before it is multiplexed and transmitted. Digital devices to

## 02 ELECTRONIC/ELECTRICAL SYSTEMS

implement design are off-the-shelf items such as gates, registers and flip-flops, which are readily amenable to large-scale integration techniques.

**B71-10087**  
**PERFORMANCE EVALUATION SYSTEM FOR INERTIAL NAVIGATION EQUIPMENT**  
 MC KERN, R. A./MIT/  
 APR. 1971  
 MSC-13542

Testing system studies inertial characteristics of gyroscopic devices. System consisting of instrument support package, dynamic test table, torque control electronics, and real-time computer evaluates performance of prototype gyroscopic strapdown units in inertial-grade attitude-reference systems. System is applicable to commercial aircraft.

**B71-10090**  
**POLAROGRAPHIC CARBON DIOXIDE TRANSDUCER AMPLIFIER**  
 STILLMAN, G./BECKMAN INSTR., INC./  
 APR. 1971  
 MSC-13728

Electronic amplifier contains matched pair of metal oxide semiconductor field effect transistor devices which have high input impedance and long-term stability. Thermistor in feedback loop provides temperature compensation for large drifts in the sensor.

**B71-10091**  
**ELECTRONIC DEVICE INCREASES THRESHOLD SENSITIVITY AND REMOVES NOISE FROM FM COMMUNICATIONS RECEIVER**  
 CONRAD, W. M./PHILCO-FORD CORP./ LOCH, P. J.  
 MAY 1971  
 MSC-12165

Threshold extension device connected between demodulator output and filter output minimizes clicking noise. Device consists of click-eliminating signal transfer channel with follow-and-hold circuit and detector for sensing click impulses. Final output consists of signal plus low level noise without high amplitude impulses.

**B71-10119**  
**STABILIZATION OF INTERFEROMETER FRINGE PATTERNS**  
 BROWN, R. M.  
 MAY 1971  
 ARC-10392

Fringe pattern motion is compensated by closed-loop servo system that adjusts a mirror mounted on piezoelectric crystal, so that path difference in interferometer is maintained at constant values at one point in the field. System is applicable to holography with continuous wave laser sources.

**B71-10126**  
**PORTABLE LOW-FREQUENCY VIBRATION MEASURING AND RECORDING SYSTEM**  
 CLEVENSON, S. A. DIBBLE, A. C.  
 MAY 1971  
 LANGLEY-10543

Information gathering system measures and records vibrations which affect personnel comfort in space, air, and surface vehicles. Three vibration transducers with mutually perpendicular axes control the frequency output of voltage controlled oscillators /VCO/. Outputs of VCO'S are multiplexed and then recorded on one track of stereo tape recorder.

**B71-10141**  
**NEW FILTER TECHNIQUE IMPROVES HOME TELEVISION RECEPTION**  
 DEVELET, J. A., JR./TRW SYSTEMS GROUP/ HUANG, M. Y.  
 STUBER, P. M.  
 MAY 1971 SEE ALSO NASA-CR-108506  
 MSC-13729

Program studies and designs combine filters and analyzes their effectiveness in improving TV quality. Signal tracking methods are improved. Combine phase-lock loop provides significant sensitivity improvement above and below threshold.

**B71-10148**  
**ISOLATED-LINE COMMUTATOR-AMPLIFIER**  
 FARNSWORTH, D. L./WESTINGHOUSE ELEC. CORP./  
 JUN. 1971  
 M-PS-20734

Commutator device combines several individual signal-input lines into single output line. Its desirable characteristics are - low input impedances, high output impedance, very high forward-to-reverse transmission ratios, and minimal gating spike coupling to either the inputs or the output.

**B71-10164**  
**A TOPOLOGICAL APPROACH TO COMPUTER-AIDED SENSITIVITY ANALYSIS**  
 CHAN, S. P. MUNOZ, R. M.  
 JUN. 1971  
 ARC-10214

Sensitivities of any arbitrary system are calculated using general purpose digital computer with available software packages for transfer function analysis. Sensitivity shows how element variation within system affects system performance. Signal flow graph illustrates topological system behavior and relationship among parameters in system.

**B71-10169**  
**A FREQUENCY DIVISION MULTIPLEX TECHNIQUE FOR TRANSMITTING COMMANDS**  
 BREY, R./SPERRY RAND CORP./  
 JUN. 1971  
 KSC-10521

Reliable random access multiplexer is controlled and operated over two twisted-pair telephone lines at distances of 5.6 to 8.0 km with control signals of less than 10 volts rms. Technique adapts to any process or environmental control system where data source is necessary.

**B71-10176**  
**IMPROVED REVERSIBLE COULOMETER CELL**  
 BOETTCHER, G. E.  
 JUN. 1971  
 SAN-10051

Cell operates either as timer or current-time integrating device in any physical orientation with better than 2 percent accuracy over temperature range of 283 K to 398 K, with input current range from few microamperes to approximately 1000 microamperes over time period of 1 sec to several hours.

**B71-10205**  
**STANDARDIZED PEARSON TYPE 3 DENSITY FUNCTION AREA TABLES**  
 COHEN, A. C./GA. UNIV./ HELM, P. R. SUGG, M.  
 JUL. 1971 SEE ALSO NASA-CR-61266  
 M-PS-20541

Tables constituting extension of similar tables published in 1936 are presented in report form. Single and triple parameter gamma functions are discussed. Report tables should interest persons concerned with development and use of numerical analysis and evaluation methods.

**B71-10213**  
**AIRCRAFT-CRASH-LOCATING TRANSMITTER FEATURES DESIGN IMPROVEMENTS**  
 MANOLI, R./N. AM. ROCKWELL CORP./ ULRICH, B. R.  
 JUL. 1971  
 M-PS-16609

Crash locator is automatically ejected from aircraft at time of crash and begins transmitting at emergency radio frequencies monitored by all airports and airport control towers. Advantages are smaller size, simpler design and installation, extended transmitting range and life, greater deployment reliability and increased crash resistance.

**B71-10218**  
**EFFICIENT DIGITAL COMPARISON TECHNIQUE FOR LOGIC CIRCUITS**  
 MC CARTHY, C. E./IBM FEDERAL SYSTEMS DIV./  
 JUL. 1971  
 M-PS-21080

Tolerance compare technique indicates discompare

B71-10220

only when numerical difference value exceeds prescribed limit. Algorithm involving binary number properties is defined, in lieu of arithmetic operation which requires relatively complex circuitry. Extension of algorithm may be made to encompass tolerances other than one unit.

B71-10220

A PSEUDO RANDOM-ACCESS SYNCHRONOUS METEOROLOGICAL SATELLITE SYSTEM  
DARCEY, R. J. MARTEL, R. J./WESTINGHOUSE ELEC. CORP./  
JUL. 1971  
GSFC-10895

Communications satellite system uses pseudo-random time frequency multiplexing technique for extracting real-time meteorological data from great number of isolated weather stations /data collection platforms/ situated randomly throughout the world.

B71-10223

SOLAR CELL POWER SCANNER  
EVANS, J. C., JR.  
JUL. 1971  
LEWIS-11280

System locates high- and low-output regions in cadmium sulfide thin film photovoltaic cells. High resolution photograph shows conversion efficiency of each scanned area. X-Y recorder fed by amplified signal from solar cell also produces power contour map. Photo and map reveal high- and low-conversion-efficiency regions.

B71-10224

ATMOSPHERIC POLLUTION MEASUREMENT BY OPTICAL CROSS CORRELATION METHODS - A CONCEPT  
FISHER, M. J. KRAUSE, F. R.  
JUL. 1971 SEE ALSO B67-10030  
N-PS-12078

Method combines standard spectroscopy with statistical cross correlation analysis of two narrow light beams for remote sensing to detect foreign matter of given particulate size and consistency. Method is applicable in studies of generation and motion of clouds, nuclear debris, ozone, and radiation belts.

B71-10226

MULTILAYERED PRINTED CIRCUIT BOARDS INSPECTED BY X-RAY LAMINOGRAPHY  
ARNESON, B. E. /IIT RES. INST./ BENNETT, H. P. GREGG, P. C. HAGEDORN, R. H. KASPARAS, R. MOLER, R. B. PAPE, R. C. RILEY, D. L.  
JUL. 1971 SEE ALSO NASA-CR-98249  
N-PS-20849

Technique produces high resolution cross-sectional radiographs with close interplane spacing for inspecting multilayer boards to be used in providing circuitry routing and module structural support.

B71-10228

MULTICHANNEL INTERCOM WITH SIMULTANEOUS SEND/RECEIVE CAPABILITY  
BUROWICK, E. A./N. AM. ROCKWELL CORP./  
JUL. 1971  
N-PS-18808

System, using only one amplifier and operating multiple inputs, eliminates push-to-talk requirement of previous systems and inhibits acoustical feedback by using microphones and headphones.

B71-10230

CONSTANT-AMPLITUDE, FREQUENCY-INDEPENDENT PHASE SHIFTER  
DEBOO, G. J.  
JUL. 1971  
ARC-10269

Electronic circuit using operational amplifiers provides output with constant phase shift amplitude, with respect to sinusoidal input, over wide range of frequencies. New circuit includes field effect transistor, Q, operational amplifiers, A1 and A2, and phase detector.

B71-10246

PORTABLE CIRCUIT-INTERRUPTION INDICATOR  
BEZANT, K. R./TWA/

JUL. 1971

KSC-10546

Device locates transient power interruptions occurring in electrical equipment. Indicator operates on principle that circuit in normal use retains residual current in the line prior to an interruption.

B71-10251

VARIABLE SWEEP-RATE SHORTENS DYNAMIC TESTING TIME  
LORENZO, C. F.  
JUL. 1971 SEE ALSO NASA-TN-D-7022  
LEWIS-11238

Method adjusts sweep frequency of tested system such that sweep is nominal when selected dynamic event occurs, but is rapid otherwise. Technique achieves time reductions of 7.5 to 1, maintains 0.5 percent accuracy in the results, and has several industrial applications.

B71-10258

STUDY OF NONDESTRUCTIVE TECHNIQUES FOR REDUNDANCY VERIFICATION  
INNOVATOR NOT GIVEN /RADIATION INC./ JUL. 1971 SEE ALSO NASA-CR-111765  
KSC-10661

Redundant functional element, together with basic elements of system, constitutes a redundant system with primary and backup capability for performing particular functions with increased reliability. Methodology is applicable to design of a verification system for hypothetical complex communication system.

B71-10263

MAN-MACHINE COMMUNICATION - A TRANSPARENT SWITCHBOARD FOR COMPUTERS  
RASMUSSEN, H./MIT/  
JUL. 1971  
MSC-13746

Device uses pattern of transparent contact touch points that are put on cathode ray tube screen. Touch point system compels more precise and unambiguous communication between man and machine than is possible with any other means, and speeds up operation responses.

B71-10276

A REAL-TIME STATISTICAL TIME-SERIES ANALYZER  
STEWART, C. H.  
AUG. 1971  
MSC-12428

Device extracts average frequency of human speech and produces second, third, and fourth moments of instantaneous frequency about this average. It operates on electrical time representation of input signal, performs statistical analysis on zero-crossing of almost any signal, and does not require specialized personnel to operate it.

B71-10282

ENVIRONMENTAL EFFECTS ON SILICON SOLAR CELLS  
BERMAN, P. MOSS, R.  
AUG. 1971 SEE ALSO NASA-CR-99338  
NPO-11475

Test results indicate that solder coating cells produces protective or deleterious effect, depending on the environment. Major problem for solder coated cells is in control of solder thickness and uniformity. Problem area for non-solder coated cells is not identified.

B71-10288

AUTOMATIC TRANSMISSION LINE MONITOR  
PARSONS, W. E. RICHARDS, L. O.  
AUG. 1971  
KSC-10385

Monitor improves complex network reliability in computer data links and command transmission lines. System evaluates circuit performance against preselected criteria, identifies and stores data indicating out-of-tolerance conditions, conducts closed loop testing, and provides for operation under command of digital computer that determines restoration priorities.

B71-10298

PRECISION CALIBRATION AND REFERENCE VOLTAGE SOURCE FOR DATA ACQUISITION SYSTEMS

INNOVATOR NOT GIVEN /GEN. INSTR. CORP./ AUG. 1971  
M-PS-20950

Hybrid integrated circuit operational amplifiers, which have inherent characteristics of low quiescent power dissipation and extended operational lifetime with high reliability, are source for digital systems. Amplifiers are coupled to Zener reference diode in current control and buffer configuration.

B71-10299  
DATA SAMPLING SYSTEM FOR MONITOR AND CONTROL STATION  
INNOVATOR NOT GIVEN /GEN. INSTR. CORP./ AUG. 1971  
M-PS-20948

System design is based on development of standardized, interchangeable modules that minimize power dissipation, interconnecting cables and size. Maximum flexibility is achieved by using building block approach where all data modules are identical and are connected at any remote location and addressed in random fashion from central unit.

B71-10307  
TONE-ACTIVATED, REMOTE, ALERT COMMUNICATION SYSTEM  
BAKER, C. D. COUVILLON, L. A. HUBBARD, W. P. KOLLAR,  
F. J. POSTAL, R. B. TEGNELIA, C. E.  
AUG. 1971  
NPO-11132

Pocket sized transmitter, frequency modulated by crystal derived tones, with integral loop antenna provides police with easy operating alert signal communicator which uses patrol car radio to relay signal. Communication channels are time shared by several patrol units.

B71-10318  
MULTIFUNCTION AUDIO DIGITIZER FOR COMMUNICATIONS SYSTEMS  
MONFORD, L. G., JR.  
AUG. 1971  
MSC-13855

Digitizer accomplishes both N bit pulse code modulation /PCM/ and delta modulation, and provides modulation indicating variable signal gain and variable sidetone. Other features include - low package count, variable clock rate to optimize bandwidth, and easily expanded PCM output.

B71-10324  
SEL-SYNCHRONIZING, BI-ORTHOGONAL CODED PCM TELEMETRY SYSTEM  
MILLER, W. MULLER, R. TAYLOR, T. YAGELOWICH, J.  
AUG. 1971 SEE ALSO NASA-TR-R-292  
GSFC-11237

Communications and data handling system improves signal to noise ratio when transmission channel is perturbed by noise. Telemetry system consists of airborne source, Gaussian additive noise channel, and ground receiver unit. Advantages of system are given.

B71-10325  
MULTISPECTRAL INFRARED IMAGING INTERFEROMETER  
POTTER, A. E., JR.  
AUG. 1971  
MSC-12404

Device permitting simultaneous viewing of infrared images at different wavelengths consists of imaging lens, Michelson interferometer, array of infrared detectors, data processing equipment for Fourier transformation of detector signal, and image display unit. Invention is useful in earth resources applications, nondestructive testing, and medical diagnoses.

B71-10326  
PHASE LOCKING OF FIELD SEQUENTIAL COLOR WHEEL FOR SMALL TV CAMERA  
NIEMEYER, L. L./WESTINGHOUSE ELEC. CORP./  
AUG. 1971  
MSC-13857

System employs synchronous motor driven by deflection waveform of TV and connected directly to color filter wheel to phase lock wheel to deflection unit. Innovation stabilizes color response of small TV cameras and allows for small, lightweight installations. Problems

associated with motor phase changes are cited.

B71-10344  
COMMUNICATIONS SYSTEM FOR ZERO-G SIMULATION TESTS IN WATER  
SMITH, H. E.  
SEP. 1971  
M-PS-21357

System connects seven observers, diver, and spare station, and utilizes public address system with underwater speakers to provide two-way communications between test subject and personnel in control of life support, so that test personnel are warned immediately of malfunction in pressure suit or equipment.

B71-10360  
LASER NET - A CONCEPT FOR MONITORING WINGTIP VORTICES ON RUNWAYS  
PUNK, B. H. JOHNSTON, K. D.  
SEP. 1971 SEE ALSO NASA-TR-X-64525  
M-PS-20857

Network of laser beams passes over runway to photodetectors on opposite side, magnitude of beam deflection indicates magnitude of density gradient encountered. Visual display of beam deflections affects go, no-go decision for takeoff and landing.

B71-10366  
SOLID-STATE DATA INTERPRETATION SYSTEM - A CONCEPT  
HAGENAU, K./BOEING CO./ PINSON, G. T.  
SEP. 1971  
M-PS-20587

Device, serving as substitute for cathode ray tubes, applies to computer input-output devices such as microfilm readers, data displays, and optical scanners. Each device operates at speed of modern computer.

B71-10370  
IMPROVED CIRCUIT AVOIDS PREMATURE POWER TRANSISTOR FAILURE  
MC LYMAN, W. T.  
OCT. 1971  
NPO-11365

Reactor inserted in the base-drive circuit of each power transistor delays the turn-on of one transistor until the other has turned off.

B71-10371  
HIGH EFFICIENCY TELEMETRY METHOD  
LIN, L. Y.  
OCT. 1971  
NPO-10388

Analog and digital mechanizations contain new combinations of known circuits that generate coefficients of Fourier series terms in accordance with harmonic content of waveform to be transmitted. Technique represents information signal more accurately than previous methods and requires fewer information bits.

B71-10391  
TELEVISION MULTIPLEXING SYSTEM  
SIMPKINS, L. G.  
OCT. 1971  
KSC-10654

System with single, standard, wideband line transmits ten or more real time TV video data displays over hard wire to recorders more than 22.5 km from source. Digital logic and integrated circuits ensure high reliability and low maintenance. System is adaptable for video sampling applications.

B71-10404  
APPLICATION OF CALIBRATION MASKS TO TV VIDICON TUBE  
BRAWNER, E. L./BENDIX CORP./ BROWN, J. J. JONKER, W. J.  
OCT. 1971  
KSC-10589

Photographic application method devised for overlaying test pattern masks on TV camera vidicon tubes prints the mask within 0.0076 cm of the vertical and horizontal center lines of the tube face. Entire process, including mask fabrication and alignment procedure, requires less than 10 minutes.

B71-10408

**B71-10408**  
**PRINCIPLES OF ERROR DETECTION AND ERROR CORRECTION CODES**

PERLMAN, M.  
NOV. 1971.  
NPO-11487

Report is reviewed which considers theoretical basis of groups, rings, fields, and vector spaces, and their relationship to algebraic coding theory. Report serves as summary for engineers and scientists involved in data handling and processing systems.

**B71-10410**  
**COMPOSITE ANTENNA FEED SYSTEM OPERATES FROM VHF TO X-BAND**

JAKSTYS, V./PHILCO-FORD CORP./  
NOV. 1971  
GSFC-11046

System has high radiation efficiency and minimal interaction between elements when inserted between a multimode, multifrequency transponder and a parabolic reflector in an airborne communications system.

**B71-10439**  
**A MULTIPLE-PLATE, MULTIPLE-PINHOLE CAMERA FOR X-RAY GAMMA-RAY IMAGING**

HOOVER, R. B.  
NOV. 1971  
N-PS-20546

Plates with identical patterns of precisely aligned pinholes constitute lens system which, when rotated about optical axis, produces continuous high resolution image of small energy X-ray or gamma ray source. Camera has applications in radiation treatment and nuclear medicine.

**B71-10440**  
**DIGITAL ASPECT CLOCK**

BARTLEY, W. C./SOUTHWEST CENTER FOR ADVANCED STUDIES/  
NOV. 1971  
ARC-10088

Digital clock precisely set and reset by pulses from a solar sensor, combined with a logic system, provides accurate time-sector division of spin-stabilized satellite. Integral times for viewing physical phenomena from various directions are equal and mean angles of viewing can be determined.

**B71-10444**  
**BEAM SQUINT CORRECTION FOR A DIPLEX, RETRODIRECTIVE PHASED ARRAY**

BARTTT, P. SATRE, W./CUTLER-HAMMER, INC./ SIELMAN, P.  
DEC. 1971  
GSFC-11023

Beam squint is eliminated by using received phase at each array element to control transmitted phase at another element. Correction method may extend to multi-element array by using ring structure.

**B71-10445**  
**PLANET GEOMETRIC CENTER TRACKER**

PLEENOR, E. G./LOCKHEED MISSILES AND SPACE CO./  
DEC. 1971 SEE ALSO NASA-CR-73162, NASA-CR-73163  
ARC-10084

Tracker has angular accuracy on order of one arc-second. Device locates planet centers even when they appear gibbous or crescent. Automatic operation without requirement for planet size input is achieved by incorporating planet radius seeking circuit.

**B71-10451**  
**THEORY AND APPLICATION OF FEEDBACK SHIFT REGISTERS**

PERLMAN, M.  
NOV. 1971  
NPO-11486

Document summarizes state-of-the-art in data processing techniques on-board spacecraft, and serves as an aid for personnel requiring tutorial knowledge of ultrareliable data processing techniques.

**B71-10502**  
**STATISTICAL MEASUREMENTS OF THE ZERO-CROSSING TIME OF A NOISY SINEWAVE**

COST, S. T./IBM/  
DEC. 1971  
GSFC-11004

Standard deviation of difference in zero crossing times of two identical sinewaves distorted by narrowband noise behaves similarly to average value of error, but deviation is approximately one order of magnitude larger.

**B71-10504**  
**VOTER COMPARATOR SWITCH PROVIDES FAIL SAFE DATA COMMUNICATIONS SYSTEM - A CONCEPT**

KOCZALA, L. J./W. AM. ROCKWELL CORP./ WILGUS, D. S.  
DEC. 1971  
MSC-13932

System indicates status of computers and controls operational modes. Two matrices are used - one relating to permissible system states, the other relating to requested system states. Concept is useful to designers of digital data transmission systems and time shared computer systems.

**B71-10517**  
**PROGRAMMED MULTIPLEXING SYSTEM SIMULTANEOUSLY MONITORS SEVERAL VOLTAGES**

WRIGHT, L. S./W. AM. ROCKWELL CORP./  
DEC. 1971  
MSC-17139

System consists of digital voltmeter with binary coded decimal output, programmer, multiplexer, and two to six gated digital displays. Maximum number of circuits monitored is determined by digital voltmeter, rate of change of parameter being measured and complexity of multiplexer design.

**B71-10530**  
**BRUSHLESS DC MOTOR WITH DUAL WINDINGS**

AUCLAIR, G. F./GE/ HERTZENDORF, B. H. MANTUEFFEL, E. W.  
DEC. 1971 SEE ALSO NASA-CR-102675  
N-PS-21290

Motor has high starting torque and high running speeds. Control system consists of Hall effect generator/resolver and associated electronic amplifiers and switches. Motor operation is described.

## 03 PHYSICAL SCIENCES

**B71-10015**  
**RESISTIVITY AND HALL MEASUREMENTS OF THERMOELECTRIC MATERIALS**

RUFF, R. D.  
JAN. 1971 SEE ALSO NASA-TN-X-53763  
N-PS-20470

Instrumentation setup measures resistivity values between .000003 and 100,000 ohm-cm and Hall values between 0.2 and 10 billion cc/coulomb, with an absolute error of less than 5 percent. Results of measurement are given for 8 electrical brush specimens and pure silver.

**B71-10022**  
**DESIGN AND DEVELOPMENT OF A FAST SCAN INFRARED DETECTION AND MEASUREMENT INSTRUMENT**

DOSTOONIAN, A. S./RAYTHEON CO./ HANITER, L. NOWAKOWSKI, M. VANZETTI, E.  
JAN. 1971  
N-PS-20749

Infrared microscope instrument measures and plots the infrared profile of semiconductor chips, transistors and integrated circuits. Infrared analyses yields information on electrical and physical properties, enabling manufacturing improvements in semiconductor performance and reliability. Operational performance and main sections of the instrument are given.

**B71-10026**  
**ULTRAVIOLET INTERFEROMETER**

DAY, R. A./OKLA. UNIV./  
JAN. 1971  
HQ-10546

Grazing-incidence multi-beam interferometer /GIMBI/

obtains high resolution spectroscopic data from ultraviolet region of the spectrum without use of concave diffraction gratings or partially reflecting coatings. Device produces interference pattern whose fringes may be sharper than those produced by a Fabry-Perot interferometer.

**B71-10031**  
**IMPROVED SOURCE OF INFRARED RADIATION FOR SPECTROSCOPY**  
 BURKHARD, D. G./P. E. C. RES. ASSOCIATES, INC./ RAO, K. N.  
 FEB. 1971  
 MSC-20613

Radiation from a crimped V-groove in the electrically heated metallic element of a high-resolution infrared spectrometer is more intense than that from plane areas adjacent to the element. Radiation from the vee and the flat was compared by alternately focusing on the entrance slit of a spectrograph.

**B71-10036**  
**A 7.6M /25-FT/ EXTREME ENVIRONMENTS SIMULATOR**  
 ARGOU, M. J. HARELL, J. W.  
 FEB. 1971 SEE ALSO NASA-CR-106222  
 NPO-11353

Stainless steel cylindrical simulation chamber permits testing equipment under extreme cold, high partial vacuums, and intense solar radiation. Applications include heat balance and temperature distribution studies, investigations of subsystem interactions, tests of attitude control equipment and sensors, and acceptance tests of complete systems.

**B71-10041**  
**AN UNCONFINED, LARGE-VOLUME HYDROGEN/AIR EXPLOSION**  
 KNIGHT, H. T./LOS ALAMOS SCI. LAB./ OTWAY, H. J.  
 REIDER, R.  
 MAR. 1971  
 NUC-11000

Cause and results of the autoignition of 283 cubic meters of hydrogen gas, of which only about 10 percent exploded, are given. Results indicate that autoignition produces an explosion which could be described as a deflagration of explosive velocity, with a shock wave of sonic velocity and minor damage potential.

**B71-10046**  
**INEXPENSIVE HIGH-TEMPERATURE FURNACE FOR THERMOCOUPLE CALIBRATION**  
 GRACEY, C. M./AEROJET-GEN. CORP./ HOFF, R. G.  
 MAR. 1971  
 NUC-10372

New furnace calibrates unknown thermocouple by comparing its electrical output to a reference thermocouple /previously calibrated by optical pyrometry/, as both are heated simultaneously. Thermocouples may be radioactive, thus heat source must be accessible by remote manipulation and inspection measurements. Advantages of furnace operation are cited.

**B71-10065**  
**MULTIPLE SHUTTERS FOR A STEREOSCOPIC CAMERA**  
 MARKER, L. W./GOERTZ OPT. CO., INC./ PERKINS, D. B.  
 BIKER, J. G. SAMPEY, H. R.  
 APR. 1971  
 MSC-13507

Focal plane shutter assembly composed of three mechanically separate rotary shutters permits exposure of three separated photographic films simultaneously with exposure time of 0.08 second. Exposure time is repeatable within 2 percent, uniformity of exposure over all three films is within 5 percent.

**B71-10066**  
**TECHNIQUE FOR EXPERIMENTAL DETERMINATION OF RADIATION INTERCHANGE FACTORS IN SOLAR WAVELENGTHS**  
 BOBCO, R. P./HUGHES AIRCRAFT CO./ NOLTE, L. J.  
 WENSLEY, J. R.  
 APR. 1971 SEE ALSO NASA-CR-101945  
 MSC-13476

Process obtains solar heating data which support analytical design. Process yields quantitative information on local solar exposure of models

which are geometrically and reflectively similar to prototypes under study. Models are tested in a shirtsleeve environment.

**B71-10068**  
**KALEIDOSCOPIC LIGHT FEEDBACK FOR TELEVISION SYSTEMS**  
 DAVIS, J. G. WOODS, J. M.  
 APR. 1971  
 MSC-12386

Technique generates special effects for broadcast television to study effects of light feedback on television systems. Signals are produced for tape recording, broadcasting, or displaying on black-and-white or color monitors. The patterns have from three to eight sides and expand, contract, or rotate at various speeds.

**B71-10085**  
**MODIFIED BUBBLE LEVEL SENSES PITCH AND ROLL ANGLES OVER WIDE RANGE**  
 MATSON, E. J./GOERTZ OPT. CO., INC./ MC NALLY, P. P.  
 APR. 1971  
 MSC-13506

Bubble level sensor with fiber-optic field flattener is simple, rugged, small, and impervious to temperature and vibration effects. Pitch angles from -15 deg to +40 deg and roll angles of +30 deg are determined within 0.5 deg.

**B71-10110**  
**IMPROVED REFLECTIVE COATING FOR INTEGRATING SPHERES**  
 STUART, J. W.  
 MAY 1971  
 GSC-10855

Inorganic salts or oxide material is transparent in single-crystal form, has high refractive index, smooth cleavage, and chemical stability, is stable to radiations of interest, partially soluble and easily dispersed in liquid for spraying, and readily dried /cured/ with reasonable cohesion and adhesion, and has good mechanical stability.

**B71-10111**  
**EXHAUST CLOUD RISE AND DIFFUSION IN THE ATMOSPHERE**  
 CHANDLER, M. W./GEOMET, INC./ CHU, R. T. THAYER, S. D.  
 MAY 1971 SEE ALSO NASA-CR-61331  
 N-PS-21119

Analytical approach develops physical-mathematical model of rocket engine exhaust cloud rise, growth, and diffusion. Analytic derivations and resultant model apply to hot exhaust cloud study or industrial stack plumes, making work results applicable to air pollution. Model formulations apply to all exhaust cloud types and various atmospheric conditions.

**B71-10112**  
**RADIANT ENERGY ABSORPTION ENHANCEMENT IN OPTICAL IMAGING SYSTEMS**  
 BROWN, R. M. GUNTER, W. D., JR.  
 MAY 1971  
 ARC-10194

Reimaging system efficiently uses incident light and overcomes previous imaging detector problems. Optical system collects reflected and focal plane transmitted light and redirects it so it again impinges on focal plane in register with original image. Reimaging unabsorbed light increases light absorption and detector use probability.

**B71-10113**  
**OPTICAL ENHANCEMENT OF PHOTOMULTIPLIER SENSITIVITY**  
 GRANT, G. R. GUNTER, W. D., JR.  
 MAY 1971  
 ARC-10213

Transmission and reflection light losses are reduced by introducing light into end-window of device at an angle large enough to normal so total internal reflection occurs at both photocathode-vacuum and window-air interfaces.

**B71-10118**  
**SYSTEM ACCURATELY CONTROLS PRESSURE IN CRYOGENIC TANKS**  
 KIRCHMEIER, W. E., JR.  
 MAY 1971  
 LEWIS-11329

High-resolution differential pressure transducer senses very small positive or negative pressure

variations in the cryogenic tank relative to absolute reference pressure. System is useful in calibrating instruments where working fluid must be maintained at closely controlled temperature, or in processes requiring very fine pressure control.

871-10120

**LASER DOPPLER INSTRUMENT MEASURES FLUID VELOCITY WITHOUT REFERENCE BEAM**

BOURQUIN, K. B. SHIGEMOTO, F. H.  
MAY 1971 SEE ALSO B66-10693, B68-10349,  
NASA-TN-D-4453  
XAC-10770

Fluid velocity is measured by focusing laser beam on moving fluid and measuring Doppler shift in frequency which results when radiation is scattered by particles either originally present or deliberately injected into moving fluid.

871-10131

**ACTIVE CAVITY RADIONETER, TYPE III - AN AUTOMATIC, ABSOLUTE STANDARD, HIGHLY ACCURATE DETECTOR**

WILLSON, R. C.  
MAY 1971  
NPO-11504

Instrument of simple construction operates without vacuum enclosure over wide pressure range and temperatures from 218 to 398 deg K and defines absolute radiometric scale to within less than 0.5 mW/sq cm. It has potential application to meteorology and climatology and operates on electrical substitution calorimeter principle.

871-10139

**MICROWAVE CRYOGENIC THERMAL-NOISE STANDARDS**

STELZRIED, C. T.  
MAY 1971 SEE ALSO NPO-10610  
NPO-11424

Field operational waveguide noise standard with nominal noise temperature of 78.09 plus/minus 0.12 deg K is calibrated more precisely than before. Calibration technique applies to various disciplines such as microwave radiometry, antenna temperature and loss measurement, and low-noise amplifier performance evaluation.

871-10143

**ELECTRICAL INSTRUMENT MEASURES POSITION AND VELOCITY OF SHOCK WAVES**

DANNENBERG, R. E. HUMPHRY, D. E.  
MAY 1971  
ARC-10356

Instrument employs a sensor consisting of twin-electrode probe mounted in shock tube wall, with small dc voltage impressed across electrodes. Power supply, amplifier, and gate pulse generator complete the system. Instrument provides data for construction of wave diagrams, as well as measurement of shock velocity.

871-10144

**SCINTILLATION DETECTOR FOR CARBON-14**

KNOLL, G. F./MICHIGAN UNIV./ ROGERS, W. L./BENDIX CORP./  
MAY 1971 SEE ALSO NASA-CR-73384  
ARC-10378

Detector consists of plastic, cylindrical double-wall scintillation cell, which is filled with gas to be analyzed. Thin, inner cell wall is isolated optically from outer (guard) scintillator wall by evaporated-aluminum coating. Bonding technique provides mechanical support to cell wall when device is exposed to high temperatures.

871-10145

**VIBRATION DETECTION USING LASERS**

MASSEY, G. A./SYLVANIA ELECTRON. SYSTEMS/  
MAY 1971  
ARC-10389

Interference displacement patterns produced when light from a laser illuminates diffusely reflecting, vibrating surface are observed and photographed. Standing wave modes on model surface can be interpreted in order to yield amplitude and frequency of vibrations. Flat, white surfaces yield best interference patterns, even over considerable surface curvature.

871-10157

**DIGITAL DECORRELATOR SAVES TIME AND EXPENSE IN ACOUSTIC TESTING OF STRUCTURES**

NAKICH, R. B./TIME ZERO CORP./ WOODBURY, R. C.  
JUN. 1971  
NPO-11542

Instantaneous signals from coherent random sound field are summed and time delayed to avoid introducing vectorial addition errors. Resultant statistically independent signals are applied to spectrometer. Displayed sound pressure level is proportional to square root of sum of squares of sound pressure levels taken over frequency range of interest.

871-10160

**DROPOUTS IN MAGNETIC TAPE RECORDING AND REPRODUCTION**

VAN, K. W.  
JUN. 1971  
NPO-11519

Judicious selection and maintenance of tape and tape transports minimizes dropouts.

871-10166

**TRIANGULAR-WAVE GENERATOR WITH CONTROLLED SWEEP POLARITY**

WONG, H. Y./LOCKHEED MISSILES AND SPACE CO./  
JUN. 1971  
ARC-10332

Generator, comprised largely of integrated circuits, has operational amplifier connected as integrator to provide linear voltage ramp, pair of logic gates and one-shot multivibrator function as sweep reverse circuit feeding the integrator. Solid state switch effects generator hold capability.

871-10180

**IMPROVED THERMAL PAINT FORMULATION**

GATES, D. W. ROGER, P. O./IIT RES. INST./ ZERLAUT, G. A.  
JUN. 1971  
M-FS-14706

Potassium silicate-treated zinc oxide paint stabilizes pigment against ultraviolet-induced, bleachable degradation in infrared region, and permits use of ZnO as pigment in ultraviolet-stable coatings based upon polymethyl siloxane elastomers and resins. Material has low absorbance/emittance ratio.

871-10191

**COMPUTER-CONTROLLED MASS SPECTROMETER FOR ON-LINE GAS ANALYSIS**

HAFNER, P. W. HOUSEMAN, J.  
JUN. 1971  
NPO-11427

System detects gases in combustion chambers and records their levels of concentration. Simplified data recording and reduction process permits analysis rate of 9 msec per peak and recording of probe position, pressures, temperatures, and mass spectrometer data on same tape. System is applicable to air pollution control.

871-10203

**WATER ELECTROLYSIS MODULE**

SCHUBERT, P. H./TRW, INC./  
JUN. 1971 SEE ALSO NASA-CR-73394  
ARC-10246

Module utilizes static water-feed electrolysis system and air-cooled fins to remove heat generated by cell inefficiencies. Module generates 0.15 pounds of oxygen and 0.0188 pounds of hydrogen at current density of 100 amps per square foot. Generator operates in aircraft, spacecraft, or submarine cabins.

871-10232

**LASER INTERFEROMETRY METHOD FOR ABSOLUTE MEASUREMENT OF THE ACCELERATION OF GRAVITY**

HUDSON, O. K.  
JUL. 1971 SEE ALSO NASA-TN-X-53832, NASA-TN-X-53856,  
NASA-TN-X-64503  
M-FS-21225

Gravimeter permits more accurate and precise absolute measurement of g without reference to Potsdam values as absolute standards. Device is basically Michelson laser beam interferometer in

which one arm is mass fitted with corner cube reflector.

B71-10235

DEVICE MEASURES CONDUCTIVITY AND VELOCITY OF IONIZED GAS STREAMS

COOK, G. R. POSCH, R. E. ROSSOW, V. J. VENDELL, E. W./UTAH STATE UNIV./

JUL. 1971 SEE ALSO NASA-TN-D-4538

XAC-05695

Coaxial arrangement of primary coil and two sensing secondary coils contained inside slender quartz tube inserted into ionized stream permits simultaneous determination of conductivity and linear velocity. System results agree favorably with theory.

B71-10236

NOISE DIFFRACTION PATTERNS ELIMINATED IN COHERENT OPTICAL SYSTEMS

GREBOWSKY, G. R. HERMANN, R. L. PAULL, H. B. SHULMAN, A. R.

JUL. 1971

GSFC-11133

Lens rotation technique of noise diffraction pattern elimination spreads diffracted energy, normally concentrated over small area of image, over much larger annular area. Technique advantages include simplified lens selecting process, reduced clean room requirements, and low cost equipment requirements.

B71-10249

LASER VIBRATION ANALYZER

POSTER, J. V.

JUL. 1971 SEE ALSO B70-10439, B71-10145, NASA-CR-985

XAC-01670

Instrument system uses laser and optical heterodyne receiver to measure Doppler phase shifts produced on a laser beam by the deflection of the vibrating surface of a structure under test or in operation.

B71-10252

OPTICAL PROBING OF SUPERSONIC FLOWS WITH STATISTICAL CORRELATION

FUNK, B. H.

AUG. 1971 SEE ALSO NASA-TN-X-53870

M-PS-20642

Remote sensing tool reliably measures statistical properties of supersonic turbulence. Tool neither affects nor is adversely affected by flow field. Device determines characteristics of supersonic flow with optical system and provides method and apparatus for separating translational and rotational motions of turbulent structures in supersonic flow.

B71-10260

THERMAL HELIOTROPE - A PASSIVE SUN-TRACKER

BYXBEE, R. C./LOCKHEED MISSILES AND SPACE CO./

JUL. 1971

GSFC-10945

Continuous sun tracking device consists of helical bimetallic coil and control mechanism. Coil produces torque and angular displacement with temperature change, and acts as device's driving element. Control mechanism, concentric shading mechanism containing bimetallic sensor coil, controls tracking rate and provides for reset cycle.

B71-10262

SURVEY OF HEAT TRANSFER TO NEAR CRITICAL FLUIDS

HENDRICKS, R. C. SIMONEAU, R. J. SMITH, R. V./NBS/

JUL. 1971 SEE ALSO NASA-TN-D-5886

LEWIS-11289

Survey topics include - heat transfer boundaries of near critical region, free, natural, and forced convection experiments, oscillations, geometric effects, parameters which appear to be significant to heat transfer in critical region, and theories which have been proposed for region.

B71-10264

DURABLE CATHODES FOR HIGH-POWER INERT-GAS ARCS

DECKER, A. J. GETTLEMAN, C. C. GOLDMAN, G. C. HALL, J. H. POLLACK, J. L.

AUG. 1971

LEWIS-11162

Cathode design minimizes evaporation of electrode material which may deposit on associated optical surfaces. It also results in stable operation and precise positioning of arc relative to optical collector. Innovation applies to high power light sources and to arcs used in industrial furnaces.

B71-10265

VARIABLE RATIO BEAM SPLITTER FOR LASER APPLICATIONS

BROWN, R. M.

AUG. 1971

ARC-10391

Beam splitter employing birefringent optics provides either widely different or precisely equal beam ratios, it can be used with laser light source systems for interferometry of lossy media, holography, scattering measurements, and precise beam ratio applications.

B71-10269

DYNAMIC RESPONSE OF VISCOUS COMPRESSIBLE FLUIDS IN RIGID TUBES

GOLDSCHMIED, F. R.

AUG. 1971

M-PS-20542

Data on experimental verification of Iberall's analysis applies to such problems as pressure sensing, pneumatic control circuits with bellows, measuring irregular shaped volumes, and transmitting fluid power by pulsating flow.

B71-10272

COMPRESSED GAS HANDBOOK

COTA, R. A. KUNKLE, J. S. WILSON, S. D.

AUG. 1971 SEE ALSO NASA-SP-3045

KSC-10662

Handbook includes thermodynamic and related fluid flow data required to analyze high pressure compressible and incompressible fluid systems. Some theory and applications include thermodynamic fundamentals, gas behavior, adiabatic and isentropic flow, shock waves, flow measurement, and adiabatic and isothermal friction flow in pipes.

B71-10273

APPROXIMATE PROPERTIES OF THE RESPONSE OF NONLINEAR DYNAMIC SYSTEMS TO STOCHASTIC INPUTS

ZIRKLE, L. D./TEX. UNIV./

AUG. 1971

M-PS-20717

Indirect method considers effect of nonlinearity and obtains approximate probability densities of certain characteristics, from these densities various statistical properties are calculated. Direct method determines response moments directly. Neither method is restricted by system motion with regard to whether or not it is stationary.

B71-10283

IMPROVED CHARGED-PARTICLE ANALYZER - A CONCEPT

DINEFF, J.

AUG. 1971

XAC-05506

Device utilizes concept that charged-particle analysis is achievable by applying sinusoidal voltage across two conductive deflection plates with predetermined curvature and constant spacing to define selective passageway for charged particles to be analyzed. Four advantages of improved device are cited.

B71-10311

RADIAL HEAT FLUX TRANSFORMER

BASIULIS, A./ECA/ BUZZARD, R. J.

AUG. 1971

NPO-10828

Unit moves heat radially from small diameter shell to larger diameter shell, or vice versa, with negligible temperature drop, making device useful wherever heating or cooling of concentrically arranged materials, substances, and structures is desired.

B71-10333

VIBRATION ANALYSIS BY TIME-AVERAGE HOLOGRAPHY

B71-10335

APRAHAMIAN, R./TRW, INC./ EVENSEN, D. A.  
SEP. 1971 SEE ALSO NASA-CR-1671  
LANGLEY-10614

Method photographs vibration modes as high as 100 kHz. Technique also measures vibration decay and damping characteristics. Compensation techniques for structural size limitations and for background noise excitations are discussed.

B71-10335

FLAME ZONE OF A COMPOSITE PROPELLANT EXPANDED BY A LASER SOURCE

FRIEDMAN, R. HERTZBERG, M. MC HALE, E. VON ELBE,  
G./ATLANTIC RES. CENTER/  
SEP. 1971  
LANGLEY-10660

Technique scales flame structure linearly with gas kinetic mean free path, which increases two to three orders of magnitude as pressure decreases like amount. Kinetic and transport time scales expand in proportion so that regression rates for laser-induced flames are two to three orders of magnitude slower.

B71-10340

LIQUID-HYDROGEN/NUCLEAR-RADIATION RESISTANT SEALS  
VAN AUKEN, R./WHITTIER CORP./

SEP. 1971  
M-PS-21364

Seal employs aromatic heterocyclic polymer, polyquinoxaline, and features resin starved laminate consisting of alternate layers of woven glass fabric and polymer film. Design gives gasket a mechanical spring characteristic, eliminating cold flow and resulting in elastic recovery when gasket is unloaded.

B71-10343

REMOTE CONTROL RADIOACTIVE-WASTE REMOVAL SYSTEM USES MODULATED LASER TRANSMITTER

BURCHER, E. E. KOPIA, L. P. ROWLAND, C. W. SINCLAIR,  
A. R.

SEP. 1971  
LANGLEY-10311

Laser remote control system consists of transmitter, auto tracker, and receiver. Transmitter and tracker, packaged together and bore sighted, constitute control station, receiver is slave station. Model has five command channels and optical link operating range of 110 m.

B71-10350

A STUDY OF NITRIDE DEVICES FOR COMPUTER MEMORY APPLICATIONS

RABURN, W. D./ALA. UNIV./

SEP. 1971  
M-PS-20971

Metal-nitride-oxide-silicon /MOS/ capacitors act like metal-nitride-silicon /MNS/ capacitors with extra interface where sheet of charge can be stored in slow states. Flatband voltage shifts over a wide range by adjusting store charge density.

B71-10351

STATISTICAL ANALYSIS TABLES FOR TRUNCATED OR CENSORED SAMPLES

COHEN, A. C./GA. UNIV./ COOLEY, C. G.  
SEP. 1971 SEE ALSO NASA-CR-61330

M-PS-21024

Compilation describes characteristics of truncated and censored samples, and presents six illustrations of practical use of tables in computing mean and variance estimates for normal distribution using selected samples.

B71-10352

VIBRATION TESTING AND ANALYSIS USING HOLOGRAPHY  
INNOVATOR NOT GIVEN /GCO, INC./ SEP. 1971 SEE ALSO  
NASA-CR-103053

M-PS-21050

Time average holography is useful in recording steady state vibrational mode patterns. Phase relationships under steady state conditions are measured with real time holography and special phase shifting techniques. Data from Michelson interferometer verify vibration amplitudes from holographic data.

B71-10353

LITERATURE REVIEW AND EXPERIMENTAL INVESTIGATION OF HEAT PIPES

BARSCHE, W. O./PURDUE UNIV./ SCHOENHALS, R. J.  
VISKANTA, R. WINTER, E. R. F.

SEP. 1971 SEE ALSO NASA-CR-102943  
M-PS-21074

Tests on heat pipes determine operational limits, external boundary conditions, noncondensable gas effects, startup behavior, and geometric configurations. Experiment consists of design, construction, and testing of an apparatus for measuring wick properties, conventional heat pipes and coplanar heat pipes.

B71-10357

OPTIMUM DOPING ACHIEVES HIGH QUANTUM YIELDS IN GaAs PHOTOEMITTERS

SONNENBERG, H./PENNSYLVANIA ELECTRON. SYSTEMS/  
SEP. 1971

M-PS-20962

Experimental data indicate that optimum doping exists. Measured quantum yield curves indicate optimum overall response is obtained in GaAs emitters with doping in high 10 to the 18th power per cm range. Doping for optimum response is not necessarily in this range.

B71-10364

INSULATION ASSEMBLY USES CRYOPUMPING TO REDUCE HEAT TRANSFER IN CRYOGENIC LIQUID LINE

MURKIN, R. C./AMETEC/STRAZA/

SEP. 1971  
KSC-10518

Flush joint coupling using foil jacketed annular cone, backfilled with carbon dioxide, eliminates inherent connection problems of conventional bayonet type joints used for vacuum jacketed assemblies.

B71-10378

SIMPLE SPECTROSCOPE USED WITH SOLID STATE IMAGE AMPLIFIER OVER WIDE SPECTRAL RANGE

BROWN, R. L., SR.

OCT. 1971 SEE ALSO B68-10363  
M-PS-21345

Prism plus image amplifier panel provides visual image of many infrared spectral lines from carbon arc impregnated with metal compound. Different metal compounds generate various desired spectra. Panel also aligns and focuses simple spectroscopes for detecting spectral lines inside and outside visible region.

B71-10383

HIGH DENSITY PLASMA GUN GENERATES PLASMAS AT 190 KILOMETERS PER SECOND

ESPY, P. N.

OCT. 1971  
M-PS-20589

Gun has thin metal foil disc which positions or localizes gas to be ionized during electrical discharge cycle, overcoming major limiting factor in obtaining such plasmas. Expanding plasma front travels at 190 km/sec, compared to plasmas of 50 to 60 km/sec previously achieved.

B71-10385

SUPERCONDUCTOR TRANSITION TEMPERATURES STUDY  
BOZOWSKI, S./ECLA/ GITTLEMAN, J. T. HANAK, J. J.

PELLICANE, J. P.

OCT. 1971 SEE ALSO NASA-CR-110432  
M-PS-21247

Compounds having beta tungsten structure exist as solid solutions over composition range of several percent. However, for most of these compounds, relationship between composition and superconducting transition temperature is not known.

B71-10388

IMPROVED ELECTRON EMITTER

NAKANISHI, S.

OCT. 1971

LEWIS-10814

Emitter applies to devices in which a plasma is generated by electron bombardment. Device is conventional hollow cathode modified by addition of integral keeper cap containing small aperture

which encloses outlet of the cathode and is held in position by ceramic tube.

B71-10395

**TONE-BURST TECHNIQUE MEASURES HIGH-INTENSITY SOUND ABSORPTION**

POWELL, J. G./LING-TEMCO-VOUGHT, INC./ VAN HOUTEN, J. J.

OCT. 1971 SEE ALSO NASA-CR-1698

LANGLEY-10667

Tone-burst technique, in which narrow-bandwidth, short-duration sonic pulse is propagated down a standing-wave tube, measures sound absorbing capacity of materials used in jet engine noise abatement. Technique eliminates effects of tube losses and yields normal-incidence absorption coefficient of specimen.

B71-10406

**OPACIFIED FIBROUS THERMAL INSULATION**

CHAMPELLAN, R. E. MC GREW, J. L./MARTIN MARIETTA CORP./

NOV. 1971

LEWIS-11235

Lightweight, opacified, glass fiber batting for high temperature insulation in cryogenic tanks has lower apparent thermal conductivity than untreated insulations. Decrease results from impeding the transmission of radiant energy without increasing the solid conductance of the material.

B71-10425

**ELEMENTS OF ORBIT-DETERMINATION THEORY - TEXTBOOK**

SOLLOWAY, C. B.

NOV. 1971

NPO-11466

Text applies to solution of various optimization problems. Concepts are logically introduced and refinements and complexities for computerized numerical solutions are avoided. Specific topics and essential equivalence of several different approaches to various aspects of the problem are given.

B71-10427

**VIRTUAL-IMAGE DISPLAY SYSTEM FOR FLIGHT SIMULATORS**

CHASE, W. D.

NOV. 1971

ARC-10175

Dual TV monitor and collimated lens system in windscreens of standard aircraft cockpit simulator permits both pilot and copilot to simultaneously view three dimensional presentation. Proper design of complete system permits depth and viewpoint of visual displays to be accurately presented.

B71-10432

**THERMAL SCALE MODELING**

MAC GREGOR, R. K./BOEING CO./

NOV. 1971 SEE ALSO NASA-CR-102671

M-FS-21268

Complex system study data indicate that factors associated with multilayer insulation pose major problem in scale modeling, that numerical analysis aids correction for known compromises of scaling criteria, and that probable errors in scale modeling experiments fall within range predicted by statistical analysis.

B71-10436

**TABLE FOR ESTIMATING PARAMETERS OF WEIBULL DISTRIBUTION**

HANN, N. R./H. AM. ROCKWELL CORP./

NOV. 1971

M-FS-18817

Table yields best linear invariant /BLI/ estimates for log of reliable life under censored life tests, permitting reliability estimations in failure analysis of items with multiple flaws. These BLI estimates have uniformly smaller expected loss than Gauss-Markov best linear unbiased estimates.

B71-10454

**IMPROVED PLASMA ACCELERATOR**

CHENG, D. Y.

NOV. 1971

ARC-10109

Converging, coaxial accelerator electrode configuration operates in vacuum as plasma gun. Plasma forms by periodic injections of high pressure gas that is ionized by electrical discharges. Deflagration mode of discharge provides acceleration, and converging contours of plasma gun provide focusing.

B71-10470

**PSYCHROMETRIC CHART FOR PHYSIOLOGICAL RESEARCH**

CHAMBERS, A. B.

NOV. 1971

ARC-10394

Chart facilitates use of graphical techniques for solving problems involving thermodynamic properties of moist air. The properties are presented, and their units of measurement are listed. Chart presenting conditions at standard atmosphere pressure at sea level is most useful.

B71-10478

**IMPROVED MOLECULAR SORBENT TRAP FOR HIGH-VACUUM SYSTEMS**

KNECHTEL, E. D. PITTS, W. C.

DEC. 1971

ARC-10056

Closed cycle refrigeration loop in which trays holding molecular sorbent are made to serve as cooling baffles improves the performance of high vacuum systems. High performance is obtained with almost no decrease in pumping speed.

B71-10484

**COMPUTERIZED METHODS FOR TRAFFICABILITY ANALYSIS**

LEWANDOWSKI, G. M./CORNELL, AERON. LAB., MC ADAMS, H. T. REESE, P. A.

DEC. 1971 SEE ALSO NASA-CR-1881

M-FS-21423

Computer program produces trafficability maps displaying terrain characteristics in digital form for computer analysis. Maps serve as aid to vehicular operation and highway planning based on maneuverability parameters.

B71-10494

**MODIFIED CAMERA RECORDS LENS SETTINGS ON FILM**

THOMPSON, R. E.

DEC. 1971

MSC-12363

Camera is modified by inserting optical imaging system between lens and film. This system requires no electrical power, is low in weight, and adds nothing to external size of the camera.

B71-10506

**SHUTTER DESIGN FOR STEREOSCOPIC CAMERA**

INNOVATOR NOT GIVEN /EASTMAN KODAK CO./ DEC. 1971

MSC-13613

Shutter design consists of two axially mounted spring driven rotating blades with two lenses mounted between the blades. Features include excellent repeatability and flash synchronization. Design permits packaging in small volume and is beneficial where focal distance, magnification, and exposure time are fixed.

B71-10519

**ANEMOMETER CALIBRATOR**

BATE, T./INCA ENG. CORP./ CALKINS, D. E. PRICE, P. VEIKINS, O.

DEC. 1971

M-FS-21424

Calibrator generates accurate flow velocities over wide range of gas pressure, temperature, and composition. Both pressure and flow velocity can be maintained within 0.25 percent. Instrument is essentially closed loop hydraulic system containing positive displacement drive.

B71-10526

**MULTICHAMBER CONTROLLABLE HEAT PIPE**

SHLOSINGER, A. P./TRW SYSTEMS GROUP/

DEC. 1971 SEE ALSO NASA-CR-1400

ARC-10199

Valve throttles transfer of vapor between heat input surface and heat rejection surface of heat pipe to control rate of transfer of energy. Valve

B71-10527

is operated by control signals which sense temperatures or pressures.

B71-10527

IMPROVING LASER BEAM COHERENCE - A CONCEPT  
HEFLINGER, L. O./TRW SYSTEMS GROUP/  
DEC. 1971 SEE ALSO NASA-CR-114274  
ARC-10417

Laser frequencies may be reduced to single frequency or selected frequencies. For single frequency performance, spacing of frequencies falls in natural line width. For two or more frequencies, thicker spacing is used. Configuration adapts to operation with Kerr or Pockel cell for Q switching.

B71-10534

MULTIFREQUENCY LASER BEAMS FOR HOLOGRAPHIC CONTOURING  
HEFLINGER, L. O./TRW SYSTEMS GROUP/ WUERKER, R. F.  
DEC. 1971 SEE ALSO NASA-CR-114274  
ARC-10341

Pulsed ruby laser emits two optical frequencies simultaneously so holographic recordings of test object give images showing desired range contours. Process enables generation of contour maps for practical applications such as gaging size and shape of mechanical parts and other structures.

B71-10536

MINIATURE CARBON DIOXIDE SENSOR  
MC HENRY, T. F./BARNES ENG. CO./  
DEC. 1971  
MSC-13332

Sensor with no moving parts measures carbon dioxide partial pressures of 0 to 40 mm Hg for total pressures up to 14 psia with a full scale accuracy of 5 percent.

## 04 MATERIALS/CHEMISTRY

B71-10004

PREPARATION OF PERFLUOROPOLYETHER PREPOLYMERS  
ROCHOW, S. E./PENINSULAR CHEMRES., INC./ STUMP, E. C., JR.  
JAN. 1971 SEE ALSO B70-10353 B71-10005  
NPO-10765

Fluorinated prepolymers are used to generate highly fluorinated polymers which possess most of the desirable properties of polytetrafluoroethylene, such as nonflammability and high corrosion resistance, while retaining good low temperature flexibility.

B71-10005

PREPARATION OF HIGHLY FLUORINATED POLYURETHANES  
ROCHOW, S. E./PENINSULAR CHEMRES., INC./ STUMP, E. C., JR.  
JAN. 1971 SEE ALSO B70-10353 B71-10004  
NPO-10767

New polyurethanes, formed from a reaction of a prepolymer diol and a perfluorinated diisocyanate, are nonflammable and possess high corrosion resistance and good low temperature flexibility. Polymer hardness increases rapidly with increasing ratio of diisocyanate to diol, but its glass transition temperature is not adversely affected.

B71-10009

FAST PEAK SELECTOR FOR MASS SPECTROMETER  
PASKO, R. M./GARRETT CORP./ SAWYER, G. M.  
JAN. 1971  
LANGLEY-10268

Analytical tool rapidly determines quantities of up to six preselected molecular species in a gaseous sample. Novel features include - /1/ ability to operate in two modes, /2/ stepping rate of two species per second, and /3/ capability for recording analysis results directly in volume percent.

B71-10010

NEW TANTALUM ALLOY HAS SUPERIOR CREEP RESISTANCE AND GOOD WORKABILITY

BUCKMAN, R. W., JR. JR.  
JAN. 1971

B71-10027

REMOTE DETERMINATION OF SEA CONDITIONS BY ELECTROMAGNETIC BACKSCATTER MEASUREMENT  
MALTZ, F. M./LOCKHEED PALO ALTO LABS./  
JAN. 1971  
M-PS-13777

Report is described which considers the effect that the ocean's surface shape has on near-vertical backscatter. Report covers the statistical character of the surface, the relation between these statistics and electric field, the characteristics of the wave system, and electromagnetic scattering.

B71-10034

ZERO-G SIMULATION SYSTEM FOR THERAPEUTIC APPLICATION  
DANE, D. H.  
MAR. 1971  
M-PS-14671

System aids in therapeutic retraining of damaged muscles or functions as walking support during therapy. Articulated harness assembly contains patient, suspension system supports harness assembly in such a way as to counterbalance exertion of external forces on patient.

B71-10042

PRODUCING GRAPHITE WITH DESIRED PROPERTIES  
DICKINSON, J. M./LOS ALAMOS SCI. LAB./ IMPRESCIA, R. J. REISWIG, R. D. SMITH, M. C.  
FEB. 1971  
NUC-11001

Isotropic or anisotropic graphite is synthesized with precise control of particle size, distribution, and shape. The isotropic graphites are nearly perfectly isotropic, with thermal expansion coefficients two or three times those of ordinary graphites. The anisotropic graphites approach the anisotropy of pyrolytic graphite.

B71-10055

AUTOMATIC BIO-SAMPLE BACTERIA DETECTION SYSTEM  
CHAPPELLE, E. W. COLBURN, M. KELBAUGH, B. N. PICCIOLO, G. L.  
APR. 1971  
GSPC-11169

Electromechanical device analyzes urine specimens in 15 minutes and processes one sample per minute. Instrument utilizes bioluminescent reaction between luciferase-luciferin mixture and adenosine triphosphate (ATP) to determine number of bacteria present in the sample. Device has potential application to analysis of other body fluids.

B71-10058

LOW TEMPERATURE FLUID BLENDER  
REPAS, G. A.  
APR. 1971  
LEWIS-11206

Blender supplies hydrogen at temperatures from 289 deg K to 367 deg K. Hydrogen temperature is controlled by using blender to combine flow from liquid hydrogen tank /276 deg K/ and gaseous hydrogen cylinder /550 deg K/. Blenders are applicable where flow of controlled low-temperature fluid is desired.

B71-10061

A CONCEPT FOR IMPROVING THE DIMENSIONAL STABILITY OF FILAMENTARY COMPOSITES IN ONE DIRECTION  
DOW, N. F./GE/ ROSEN, B. W.  
APR. 1971 SEE ALSO NASA-CR-1324  
LANGLEY-10443

Investigation of filamentary composites having high strength and stiffness and a zero thermal coefficient of expansion in one direction shows that advanced filament materials, such as boron, have substantial advantages over conventional filamentary composites. Various other results are discussed, including guidelines and analysis methods for further evaluation.

B71-10077

NONFLAMMABLE ORGANIC-BASE PAINT FOR OXYGEN-RICH ATMOSPHERES

HARWELL, R. J. KEY, C. P. KRUPNICK, A. C.

APR. 1971

M-PS-20486

New paint formulations, which combine aqueous latex paints with inorganic pigments and additives, produce coatings that are self-extinguishing in pure oxygen at pressures up to twice the partial pressure of atmospheric oxygen. A paint formulation in percent by weight is given and the properties of resultant coatings are discussed.

B71-10078

UPDATED, EXPANDED, FLUID PROPERTIES HANDBOOK

GERSHMAN, R./MCDONNELL DOUGLAS CORP./ OSUGI, J. T.

SHERMAN, A. L.

APR. 1971

M-PS-21169

Revised handbook presents quantitative data, in the form of graphs and charts, pertaining to thermodynamic properties of specific cryogenic fluids and several metals. References to sources of data are cited.

B71-10079

RIGID OPEN-CELL POLYURETHANE FOAM FOR CRYOGENIC

INSULATION

PADDOUL, J. R. LINDQUIST, C. R./UNION CARBIDE CORP./

NIENDORF, L. R. NIES, G. E. PERKINS, P. J.

MAY 1971 SEE ALSO NASA-TN-X-52332

LEWIS-11220

Lightweight polyurethane foam assembled in panels is effective spacer material for construction of self-evacuating multilayer insulation panels for cryogenic liquid tanks. Spacer material separates radiation shields with barrier that minimizes conductive and convective heat transfer between shields.

B71-10097

SALT STABILIZER FOR PREVENTING CHLORINE DEPLETION AND

INCREASING SHELF-LIFE OF POTABLE WATER - A CONCEPT

COPELAND, E. J./N. AM. ROCKWELL CORP./ EDGERLEY, R. H.

MAY 1971

MSC-17153

Proposed concept, based on law of mass action uses addition of salt to increase chlorine ions produced in sodium hydrochlorite solutions, thereby increasing solution shelf-life. This technique is not costly. Usefulness will be determined by acceptability of salt in product undergoing long shelf-life.

B71-10099

ULTRASONIC METAL ETCHING FOR METALLOGRAPHIC ANALYSIS

YOUNG, S. G.

MAY 1971 SEE ALSO NASA-TN-D-6014

LEWIS-11230

Ultrasonic etching delineates microstructural features not discernible in specimens prepared for metallographic analysis by standard chemical etching procedures. Cavitation bubbles in ultrasonically excited water produce preferential damage /etching/ of metallurgical phases or grain boundaries, depending on hardness of metal specimens.

B71-10104

METAL ALLOY RESISTIVITY MEASUREMENTS AT VERY LOW

TEMPERATURES

CHILDS, G. E./NBS/ CLARK, A. P. WALLACE, G. H.

MAY 1971

NUC-10557

High speed, automated system accurately measures to approximately one percent in three minutes. System identifies materials having constant thermal or electric conductivity, predicts new material properties, develops alloys in accordance with desired specifications, and develops nondestructive devices for measuring precipitation hardening.

B71-10105

THERMAL CONDUCTIVITY OF GASEOUS AND LIQUID HYDROGEN

DILLER, D. E./NBS/ BODER, H. M.

MAY 1971

NUC-10558

Normal and para-hydrogen conductivity measurements at temperatures from 200 to 17 deg K, at densities up to 2.6 times critical density, and

at pressures to 15 MM/sq m are made. Using new calorimeter, data are analyzed as functions of density at fixed temperatures and of temperature at fixed densities

B71-10149

INEXPENSIVE ANTI-FOG COATING FOR WINDOWS

CARRIN, D. L., JR./BROWN AND ROOT-NORTHROP/ MORRISON, H. D.

MAY 1971

MSC-13530

Coating applications include anti-fog protection for deep-sea diving equipment, fire protection helmets, and windows of vehicles used in hazardous environments. Basic coating composition includes liquid detergent, deionized water, and oxygen compatible fire-resistant oil. Composition prevents visor fogging under maximum metabolic load for 5 hours and longer.

B71-10154

SYNTHESIS OF FLUORINATED ORGANIC COMPOUNDS USING

OXYGEN DIFLUORIDE

TOY, M. S./MCDONNELL DOUGLAS, INC./

JUN. 1971

NPO-12061

Oxygen difluoride synthesis is a much simpler, higher-yield procedure than reactions originally followed to synthesize various fluorinated organic compounds. Extreme care is taken in working with oxygen difluoride as its reactions present severe explosion hazard.

B71-10158

EFFECT OF SIZE ON CRACKING OF MATERIALS

GLUCKLICK, J.

JUN. 1971 SEE ALSO JPL-TR-32-1438

NPO-11602

Brittle behavior of large mild steel elements, glass plasticity, and fatigue specimen size sensitivity are manifestations of strain-energy size effect. Specimens physical size effect on material cracking initiation occurs according to flaw distribution statistics. Fracture size effect depends on stability or instability of crack propagation.

B71-10161

NEW UNDERSTANDING OF FIBER COMPOSITE MATERIALS

ZWEBEN, C.

JUN. 1971

NPO-11605

Statistical bounding approach to study of filamentary composites provides understanding of their fracture mechanics. Comparison shows that bounds are in good agreement with data from several fiber-matrix systems, and that they can be used to interpret strength data and provide fracture behavior information leading to improved strength.

B71-10165

AUTOMATIC AMINO ACID ANALYZER

BERDAHL, B. J. CARLE, G. C. OTAMA, V. I.

JUN. 1971

ARC-10215

Analyzer operates unattended or up to 15 hours. It has an automatic sample injection system and can be programmed. All fluid-flow valve switching is accomplished pneumatically from miniature three-way solenoid pilot valves.

B71-10172

PREPARATION OF HOMOGENEOUS VITREOUS MATERIALS FOR

ELECTRONIC AND OPTICAL DEVICES

GATOS, H. C./MIT/ PLATAKIS, N. S. WITT, A. P.

JUN. 1971

HQ-10670

Vitreous material builds up as series of solidified layers on inside walls of sealed quartz ampoule containing molten constituents of material, and forms well defined shapes to close dimensional tolerances. Ampoules are made of material which does not react with melt and has lower thermal expansion coefficient than solidified layer.

B71-10184

POLYMER CONTAINING FUNCTIONAL END GROUPS IS BASE FOR NEW POLYMERS

B71-10195

HIRSHFIELD, S. M./N. AM. ROCKWELL CORP./  
JUN. 1971  
NPO-10998

Butadiene is polymerized with lithium-p-lithiophenoxide to produce linear polymer containing oxy-lithium group at one end and active carbon-lithium group at other end. Living polymers represent new approach to preparation of difunctional polymers in which structural features, molecular weight, type and number of end groups are controlled.

B71-10195

TEARDOWN ANALYSIS FOR DETECTING SHELF-LIFE DEGRADATION  
ECKSTEIN, A. S.  
JUN. 1971  
M-PS-24017

Analysis is guideline in examining component materials, analytically determining physical properties and chemical compositions, and developing control data necessary for ascertaining effects of environments and their influence on deterioration and degradation mechanisms.

B71-10197

EROSION OF METALS BY MULTIPLE IMPACTS WITH WATER  
RUDI, S. L./HYDRONAUTICS, INC./ THIRUVENGADAM, A.  
JUN. 1971 SEE ALSO NASA-CR-1288  
HQ-10591

Investigation determines - relation between impact velocity and minimum number of impacts producing visible erosion, relation between high frequency fatigue stresses and number of cycles to failure, water-hammer stresses relation to high frequency endurance limit, erosion rate as exposure time function, and correlates experimental data with recent theory.

B71-10198

IMPROVED FIRE-RESISTANT COATINGS  
HUTT, J. B. STUART, J. W.  
JUN. 1971  
GSPC-10072

Water-base coatings containing potassium silicate show improvement in areas of quick air-drying, crack, craze, and abrasion resistance, adherence, and leach resistance. Coatings are useful as thermal-barrier layers in furnaces, and as general purpose fire resistant surfaces where vapor impermeability is not a requirement.

B71-10208

NONDESTRUCTIVE TESTING OF ADHESIVE BONDS BY NUCLEAR QUADRUPOLE RESONANCE METHOD  
HEWITT, R. B./ARA, INC./  
JUL. 1971 SEE ALSO NASA-CR-61988  
M-PS-21160

Inert, strain sensitive tracer, cuprous oxide, added to polymeric adhesive ensures sufficiently large signal to noise ratio in NQR system output. Method is successful, provided that RF-transparent structural materials are used between modified adhesive and probe of NQR spectrometer.

B71-10209

SENSITIVE GASEOUS HYDROGEN DETECTION SYSTEM  
MACINTYRE, J. R./GE/ NEPPLE, W. C.  
JUL. 1971 SEE ALSO NASA-CR-10268  
M-PS-21161

System utilizing new type hydrogen sensor has overall detection sensitivity and response speed higher than conventional hot-wire or hot-thermistor detectors. System measures concentrations of from 2 parts per million to 30 percent and is adaptable as leak detector and hazard alarm wherever hydrogen is used.

B71-10210

A NEW METALATION COMPLEX FOR ORGANIC SYNTHESIS AND POLYMERIZATION REACTIONS  
HIRSHFIELD, S. M./N. AM. ROCKWELL CORP./  
JUL. 1971  
NPO-10313

Organometallic complex of N,N,N',N' tetramethyl ethylene diamine /TMEDA/ and lithium acts as metalation intermediate for controlled synthesis of aromatic organic compounds and polymer

formation. Complex of TMEDA and lithium aids in preparation of various organic lithium compounds.

B71-10216

UNIQUE INTERMETALLIC COMPOUNDS PREPARED BY SHOCK WAVE SYNTHESIS  
OTTO, G. REECE, O. Y. ROY, U./ALA. UNIV./  
JUL. 1971  
M-PS-20861

Technique compresses fine ground metallic powder mixture beyond crystal fusion point. Absence of vapor pressure voids and elimination of incongruous effects permit application of technique to large scale fabrication of intermetallic compounds with specific characteristics, e.g., semiconduction, superconduction, or magnetic properties.

B71-10217

PROMISING BORON/GRAPHITE/RESIN COMPOSITES  
EVENSEN, H. A./WITTAKER CORP./  
JUL. 1971 SEE ALSO NASA-CR-102944  
M-PS-21126

Lightweight composite has high specific strength and stiffness and remains effective under extreme environmental conditions. Use as engineering material is feasible because it has excellent mechanical properties and is easily produced within small tolerances on constituent volume fractions. Main benefit of composite is its improved longitudinal strength and modulus.

B71-10225

STRAIN GAGE PERFORMANCE ABOVE 1033 K  
NICHOLS, D. W./N. AM. ROCKWELL CORP./  
JUL. 1971  
M-PS-18831

Study provides compendium of test methods and results which may be used in evaluating high temperature environment gage behavior. Tests include resistance to ground and drift rate and gage factor variation as temperature function. Variation ranged from zero at room temperature (297 K) to 14.5 percent at 1053 K.

B71-10229

OXIDATION-RESISTANT SILICIDE COATING APPLIED TO COLUMBIUM ALLOY SCREEN  
TORGERSON, R. T./BOEING CO./  
JUL. 1971 SEE ALSO NASA-CR-73246  
ARC-10186

Coated screens withstand temperature cycling in special transpiration-cooling systems and provide porous surface that is effective at temperatures well above those limiting superalloy screen efficiency. Thickness of coating depends on time, temperature and activator concentration. Coatings are uniform and resistant to thermal cycling.

B71-10245

EVALUATION OF OMNIWEAVE REINFORCEMENT FOR COMPOSITE FABRICATION  
BELMAN, R./GE/ EDIGHOFFER, H. FENTON, R. LOWE, D. WEISLER, M.  
JUL. 1971 SEE ALSO NASA-CR-102916  
M-PS-20946

Molded composites made from type-2 Morganite and/or boron are suitable for structural skins. Layered-in-depth omniweave construction yields higher in-plane strength characteristics than fiber-pitch angle construction, and strength and moduli data vary with fiber orientation.

B71-10255

STATISTICAL CHARACTERIZATION OF PHENOLIC-NOVOLAK STRUCTURES  
PARKER, J. A. WINKLER, E. L.  
JUL. 1971  
ARC-10393

Three statistical methods of general validity are valuable for characterizing any polymer which results from chain polymerization of multifunctional branching monomers linked through bifunctional monomers.

B71-10259

MODIFICATION OF PHYSICAL PROPERTIES OF FREEZE-DRIED RICE

HUBER, C. S./TECHNOL. INC./

JUL. 1971

MSC-13540

Freeze cycling process consists of alternately freezing and thawing precooked rice for two cycles, rice is then frozen and freeze-dehydrated in vacuum sufficient to remove water from rice by sublimation. Process modifies rice grain structure and porosity, enabling complete rehydration in one minute in hot water.

B71-10261

IMPROVED EPOXY RESIN FOR CONSTRUCTING CRYOGENIC FILAMENT-WOUND PRESSURE VESSELS

MOLBO, R./AEROJET-GEN. CORP./ SOFFER, L. M.

JUL. 1971 SEE ALSO NASA-CR-72114

LEWIS-11261

Mechanical properties of new resin at cryogenic temperatures are substantially improved over similar composite structures utilizing conventional resins, while properties at ambient temperature are identical to conventional resin composites.

B71-10277

MODIFICATIONS TO A VACUUM ASSISTED FILTERING DEVICE TO MINIMIZE CONTAMINATION

GAUDIANO, S.

AUG. 1971

MSC-13733

High purity filter unit saves time and expense in laboratory operations and improves purity of liquids processed. Any but most viscous liquids are processed by modified unit equipped with appropriate filter medium. Unit's use eliminates much glassware cleaning tedium.

B71-10278

A SILVER ION WATER STERILIZATION SYSTEM

PARRY, E. P./N. AM. ROCKWELL CORP./

AUG. 1971

MSC-15734

Small amounts of silver are incorporated in mixture of ion exchange resins, and water passing through this mixture is thus exposed to silver ion concentration. System is useful in self-contained water systems except city water systems where residual chlorine level is stipulated.

B71-10289

IMPROVED INSULATING MATERIALS EFFECTIVE AT EXTREMELY HIGH TEMPERATURES

CARLSON, L. W./N. AM. ROCKWELL CORP./

AUG. 1971

NPO-12067

Wrapped molybdenum foil with silica fabric insulation and wrapped tantalum foil with carbon fabric insulation are usable to 1367 K and up to 2478 K, respectively, both offer marked space saving and efficiency in high temperature operations. Graph displays temperature profiles at end of firing period.

B71-10290

GRANULAR TWO-PHASE INSULATION SYSTEMS

CARPENTER, H. W./ROCKETDYNE/

AUG. 1971 SEE ALSO B71-10289

NPO-12068

Easily prepared system, consisting of matrix of hollow zirconia microspheres containing dispersed tungsten powder, produces minimum-cost, prototype test specimen. Combination represents basic concept of highly reflective dispersed phase in low density insulative matrix and is stable at 2200 K. Other combinations of materials are suggested.

B71-10291

POLYMERIZATION OF PERFLUOROBUTADIENE AT NEAR-AMBIENT CONDITIONS

TOY, M. S./MC DONWELL DOUGLAS CORP./

AUG. 1971

NPO-10447

Peroxide catalyst under mild conditions initiates homopolymerization of perfluoro butadiene to new linear perfluoro polyenes and vulcanizable fluoro elastomers. Resulting polyperfluoro butadiene serves as hard elastomer for good chemical

resistance, as intermediate in graft polymerizations, and as crosslink for high molecular weight materials.

B71-10297

EXPERIMENTAL DETERMINATION OF DAMPING PARAMETERS OF VISCOELASTIC MATERIALS

HOWARD, R. T./IBM/ MACE, E. W.

AUG. 1971

M-FS-20534

Tuned-resonance method requires measurement of maximum transmissibility and frequency at that point to determine dynamic modules and loss modulus of elasticity.

B71-10300

SYNTHESIS OF A NEW CLASS OF HIGHLY FLUORINATED ALIPHATIC DIISOCYANATES

WARNER, D. A./PENINSULAR CHEMRES., INC./

AUG. 1971

M-FS-20883

Synthesis is basis for preparation of polyurethanes that are compatible with liquid oxygen. The two step process preparation from fluorocarbon diacid fluorides is explained in text.

B71-10303

COATINGS FROM COPOLYMERS OF TETRAPHENOXYSILANE AND P,P'/-BIPHENOL

DUNNAVANT, W. R./BATTELLE MEM. INST./ MARKEL, R. A.

OCT. 1971 SEE ALSO NASA-CR-85820

M-FS-14947

Resultant resin from copolymers is highly crosslinked and completely aromatic. Procedure develops polyaryoxysilane structure in situ after the substrate has first been coated with a prepolymer. Resins are useful as protective coatings for metals, ceramics, glass, and other materials that accommodate relatively high curing temperatures.

B71-10310

INVESTIGATION TO IDENTIFY PAINT COATINGS RESISTIVE TO MICROORGANISM GROWTH

COOPER, C. W./BATTELLE MEM. INST./ KEMP, H. T.

AUG. 1971 SEE ALSO B69-10181, NASA-CR-111524

M-FS-20458

All selected coatings contain nutrients that support microbial growth and survival. Incorporation of microbiocidal agents into coatings more susceptible to attack is recommended for improved inhibition of microorganism growth and for increased protection against deterioration of coatings by microorganisms.

B71-10317

INSTANT ACTING ADHESIVE SYSTEM

DAVIS, T. R./NATL. CASH REGISTER CO./ HAINES, R. C.

AUG. 1971

MSC-13732

Adhesive develops 80 percent of minimum bond strength of 250 psi less than 30 sec after activation is required. Adhesive is stable, handles easily, is a low toxic hazard, and is useful in industrial and domestic prototype bonding and clamping operations.

B71-10319

ESTIMATING CARBON MONOXIDE EXPOSURE

EDGERLEY, R. H./N. AM. ROCKWELL CORP./

AUG. 1971

MSC-17211

Method predicts effects of carbon monoxide on astronauts confined in spacecraft cabin atmospheres. Information on need for low toxicity level also applies to confined spaces. Benefits are applicable to industry and public health.

B71-10320

RAPID METHOD FOR SAMPLING METALS FOR MATERIALS IDENTIFICATION

HIGGINS, L. E./N. AM. ROCKWELL CORP./

AUG. 1971

MSC-17332

Nondestructive process similar to electrochemical machining is useful in obtaining metal samples from places inaccessible to conventional sampling

B71-10331

methods or where methods would be hazardous or contaminating to specimens. Process applies to industries where metals or metal alloys play a vital role.

B71-10331

SOLVATION AGENT FOR DISULFIDE PRECIPITATES FROM INHIBITED GLYCOL-WATER SOLUTIONS

TAYLOR, M. P./BOEING CO./

DEC. 1971

MSC-13695

Small additions /0.01 percent or less/ of triethanolamine sodium sulfite adduct to mercapto benzothiazole inhibited glycol water heat transfer solutions containing disulfide precipitate produce marked reduction in amount of precipitate. Adduct is useful as additive in glycol base antifreezes and coolants.

B71-10339

NEW MATERIALS FOR FIREPLACE LOGS

RIESELBACK, D. J./CONTINUING EDUC. PROJ./ SMOCK, A. W.

SEP. 1971

M-FS-21363

Fibrous insulation and refractory concrete are used for logs as well as fireproof walls, incinerator bricks, planters, and roof shingles. Insulation is lighter and more shock resistant than fireclay. Lightweight slag bonded with refractory concrete serves as aggregate.

B71-10342

NASA-TRICOT - A LIGHTWEIGHT, RADAR REFLECTIVE, KNITTED FABRIC

MATHEWS, F. WHITE, E.

SEP. 1971

LANGLEY-10776

Fabric knitted on conventional knitting machines uses commercially available yarns, has high aerodynamic drag capability, and is relatively inexpensive. The two yarn components used are 15-denier nylon monofilament and aluminized Mylar tape.

B71-10356

EXPLOSIVE BONDED TZM-WIRE-REINFORCED C129Y COLUMBIUM COMPOSITES

REECE, O. Y.

SEP. 1971

M-FS-20925

Technique consists of positioning layers of TZM metal filaments between thin C129Y columbium sheets and joining multiple sheet stacks by single explosive joining operation. Metallurgical bonds are excellent, external heat is not required, process is relatively inexpensive, and resulting composites are considerably stronger than base alloy.

B71-10359

SIMPLIFIED PROCEDURE FOR EMISSION SPECTROCHEMICAL ANALYSIS

GORDON, W. A.

SEP. 1971 SEE ALSO B67-10404, NASA-TN-D-5532

LEWIS-10985

Procedure involves dissolution of samples to prepare them for analysis, and uses single set of experimental conditions to analyze wide variety of materials and compositions without compromising analysis accuracy. Automated spectrometer alloys per sample analysis time of four minutes after sample dissolution.

B71-10362

EFFECTS OF THE THERMAL STERILIZATION PROCEDURE ON POLYMERIC PRODUCTS

CAMPBELL, B. A. KALPANY, S. H.

SEP. 1971 SEE ALSO NASA-CR-80434

NPO-1168d

Properties of samples are tested, after thermal exposure, and values are compared with unexposed samples. Thermal stability or compatibility ratings of formulated or compounded organic polymers using trade names are made and degree of change in measured properties is assessed. Products are rated compatible, marginal, or not compatible.

B71-10393

ANTIPOLLUTION SYSTEM TO REMOVE NITROGEN DIOXIDE GAS

METZLER, A. J. SLOUGH, J. W.

OCT. 1971

LEWIS-11297

Gas phase reaction system using anhydrous ammonia removes nitrogen dioxide. System consists of ammonia injection and mixing section, reaction section /reactor/, and scrubber section. All sections are contained in system ducting.

B71-10394

RESIN ADDITIVE IMPROVES PERFORMANCE OF HIGH-TEMPERATURE HYDROCARBON LUBRICANTS

JOHNSON, R. L. LOOMIS, W. R.

OCT. 1971 SEE ALSO NASA-CR-72615

LEWIS-11364

Paraffinic resins, in high temperature applications, improve strength of thin lubricant film in Hertzian contacts even though they do not increase bulk oil viscosity. Use of resin circumvents corrosivity and high volatility problems inherent with many chemical additives.

B71-10403

HIGH-STRENGTH LARGE-DIAMETER CARBON-BASE FIBERS

HOUGH, R. L./HOUGH LAB./

OCT. 1971 SEE ALSO NASA-CR-72770

LEWIS-11167

Material is applicable as reinforcement for metal matrix composites. Composites with large diameter, carbon base monofilaments offer advantages of superior strength at high temperatures and low density and for high temperature equipment where component weight must be minimized.

B71-10411

SCREENING METHOD IMPROVES PERFORMANCE OF NICKEL-CADMIUM BATTERIES

HALPERT, G.

NOV. 1971

GSFC-11260

Weight of single plate in batch is used as criterion for selecting those plates with uniform, high ampere hour capacity. When substrate and plaque weights are uniform, observed current capacity differences are dependent on quantity of active material in plaque.

B71-10434

SHIELDING METHOD FOR POLYCRYSTALLINE AND EPITAXY GROWTHS

BUE, J. L./TRW, INC./

NOV. 1971

M-FS-20162

Technique prevents silicon wafers from adhering to susceptor following silicon epitaxial deposition. Annular ring of refractory material goes around wafer during epitaxial deposit. Silicon is deposited on ring, susceptor, and portions of wafer. Ring breaks away from susceptor and wafer and no silicon undergrowth occurs.

B71-10437

EXTERNALLY PROGRAMMED VARIABLE TIMER

GULBIS, P. R./SPERRY RAND/

NOV. 1971

M-FS-20776

Device satisfies 1-sec, 5-sec, and 10-min timing requirements. Temperature and voltage range accuracy is plus or minus 3.9 percent with voltage variations of 24 to 31 Vdc over temperature range of minus 55 deg C to plus 125 deg C.

B71-10442

THERMALLY STABLE POLYIMIDES FROM SOLUTIONS OF MONOMERIC REACTANTS

DELVIGS, P. LIGHTSEY, G. R. SERAFINI, T. T.

NOV. 1971 SEE ALSO NASA-TM-X-67803

LEWIS-11325

Monomer solutions have high solubility and low solution viscosity. Since monomers are shipped in powder form and reaction to polyimide-acid prepolymer is omitted, the cost is low and handling is easy.

B71-10443

INSOLUBILIZATION PROCESS INCREASES ENZYME STABILITY  
BILLINGHAM, J. LYB, J./BATTELLE MEM. INST./  
NOV. 1971 SEE ALSO NASA-CR-73354  
ARC-10314

Enzymes complexed with polymeric matrices contain properties suggesting application to enzyme-controlled reactions. Stability of insolubilized enzyme derivatives is markedly greater than that of soluble enzymes and physical form of insolubilized enzymes is useful in column and batch processes.

B71-10474

GAS CHROMATOGRAPH SAMPLE-TRANSFER VALVE

WANG, W. S.-S./TRW. INC./ WRIGHT, H. W., JR.

DEC. 1971

ARC-10427

Slide-type gate valve incorporates sampling volume and transfer passageway for guiding a metered quantity of gas from pressurized test cell to gas chromatograph. Gate is moved by pneumatic bellows-type actuator.

B71-10482

GRAPHITE-REINFORCED ALUMINUM COMPOSITE

LALACONA, P. P.

DEC. 1971

M-FS-21077

Metallic composite prepared for utilization which remains intact without aluminum/carbon reactions, is less expensive than other structural materials, and yields a flexible composite material.

B71-10483

DEVELOPMENT OF CONFORMAL COATING MATERIALS

GLICKMAN, S. A./THIOL CHEM. CORP./ SONENSTEIN, G. G.

DEC. 1971 SEE ALSO NASA-CR-102743

M-FS-21393

New polymeric compositions appear useful as coatings on electronic circuitry operating in rigorous environments. Formulation of their compositions is based on nitrosofluorocarbon polymers having active cure sites.

B71-10488

NEW PRIMERS FOR ADHESIVE BONDING OF ALUMINUM ALLOYS

BURRELL, B. W./AVCO CORP./ PORT, W. S.

DEC. 1971 SEE ALSO NASA-CR-102846

M-FS-21387

Synthetic polypeptide adhesive primers are effective, with high temperature epoxy resins, at temperatures from 100 deg to 300 deg C. Lap-shear failure loads and lap-shear strength of both primers are discussed.

B71-10489

HIGH-TEMPERATURE STRENGTH OF PREALLOYED-POWDER

PRODUCTS INCREASED BY HEAT/PRESSURE TREATMENT

ASHERBROOK, R. L. PRECHER, J. C. WATERS, W. J.

DEC. 1971 SEE ALSO B69-10293, NASA-TN-D-6072

LEWIS-11229

Heat treatment process involves heating products to a temperature above the solidus, and subsequently applying pressure at a temperature below the solidus. Technique can be modified to one step process involving simultaneous application of both high pressure and heat. Process is not limited to cobalt-base alloys.

## 05 LIFE SCIENCES

B71-10024

HYDRAULICALLY OPERATED TILT TABLE

GAUSE, R. L. SPIER, R. A.

JAN. 1971

M-FS-21047

Table raises, lowers, or tilts test subject from vertical through an angle of 105 deg to a head-down position of 15 deg. Table is designed for medical center or laboratory use. Additional features are described.

B71-10047

RAPID ANALYTICAL DETERMINATION OF GLUTARALDEHYDE CONCENTRATIONS

FRIGERIO, N. A. SHAW, M. H.

MAR. 1971

ARG-10413

Technique utilizes the iodimetric procedure which adds unknown excess of bisulfite to glutaraldehyde /GA/ then titrates unreacted bisulfite with standard iodine isotope to determine GA concentrations. Technique may interest microscopists, food researchers, biochemical or medical laboratories, and drug manufacturers.

B71-10051

BACTERIAL ADEPHOSINE TRIPHOSPHATE AS A MEASURE OF URINARY TRACT INFECTION

CHAPPELLE, E. W. PICCIOLO, G. L.

MAR. 1971

GSPC-11092

Procedure detects and counts bacteria present in urine samples. Method also determines bacterial levels in other aqueous body fluids including lymph fluid, plasma, blood, spinal fluid, saliva and mucous.

B71-10059

MINIATURE GRINDER FOR SOLID SPECIMENS

HOUSER, C. P./HAYES INTERN. CORP./ PESCH, W. A.

MAR. 1971

M-FS-20005

Machine grinds fines to appropriate micron sizes with the least biological trauma and greatest degree of reproducibility. Device controls destruction of material so that recovery of microorganisms is as great as possible and protects operation and grinding products from exogenous contamination.

B71-10063

IMPROVED WAX MOLD TECHNIQUE FORMS COMPLEX PASSAGES IN SOLID STRUCTURES

HELLBAUM, R. F. PAGE, A. D. PHILLIPS, A. R.

APR. 1971

XLA-07829

Low-cost fabricating technique produces minute, complex air passages in fluidic devices. Air jet interactions in these function as electronic and electromechanical control systems. Wax cores are fabricated without distortion by two-wax process using nonsoluble pattern-wax and water-soluble wax. Significant steps in fabrication process are discussed.

B71-10092

PRESSURIZED SUITS CAN BE FABRICATED WITH ADJUSTABLE DIMENSIONS

KORABOWSKI, J. J./HAMILTON STD./ MARONI, M. A., JR.

MAY 1971

MSC-12398

Root cords sewn within tube-like channels form a fabric convolute. Cord length adjusts to individual wearer's dimensions.

B71-10096

IMPROVED METHOD OF USING PARA-FORMALDEHYDE AS A DISINFECTANT

MILNER, J. P./N. AM. ROCKWELL CORP./

MAY 1971

MSC-15887

Paraformaldehyde decreases required enclosed compartment disinfectant time and temperature by vaporizing powdered material from water slurry. Fire and explosion hazard at lower temperature is reduced. Total mixture evaporation occurs at plate temperature of approximately 167 deg K below that required to vaporize powdered material.

B71-10107

MULTINODE ERGOMETER SYSTEM

BYNUM, B. G. GAUSE, R. L. SPIER, R. A.

MAY 1971

M-FS-21044

System overcomes previous ergometer design and calibration problems including inaccurate measurements, large weight, size, and input power requirements, poor heat dissipation, high

flammability, and inaccurate calibration. Device consists of lightweight, accurately controlled ergometer, restraint system, and calibration system.

B71-10124

EKG ISOLATOR

PALMER, E. HASQUIN, J. R. SMITH, H. E.

MAY 1971

M-PS-21236

Light beam transmits heartbeat signal from electrodes on patient to electrocardiograph without exposing patient to possible severe electrical shock. System provides complete isolation between patient and EKG instrumentation.

B71-10137

SPRAY MOMENTUM MEASURING SYSTEM

SHEPPFIELD, E. W./TRW SYSTEMS GROUP/

MAY 1971

MSC-12305

Technique enables accurate prediction of erosion and cavitation produced by fluid spray. Method measures high velocity sprays produced by small orifices. Originally designed to determine oxidizer-injection patterns of liquid fueled rocket engines, technique is used with other liquids, or, with appropriate modification, with gases.

B71-10163

MINIATURE IMPLANTABLE INSTRUMENT MEASURES AND TRANSMITS HEART FUNCTION DATA

LEE, R. D.

JUN. 1971

ARC-10201

Heart diameter is derived from measured transit time of 2.25 MHz ultrasonic pulse between two piezoelectric crystals attached to diametrically opposite heart surfaces. Miniature instrument implanted in chest telemeters information to external receiver-converter. System permits continual dimensional data recording taken from awake animals during long-term experiments.

B71-10167

STABLE, INFLATABLE LIFE RAFT FOR HIGH SEAS RESCUE OPERATIONS

BARNETT, J. H., JR. HARRISON, F. MARAK, R. RADNOSKY, M. I.

JUN. 1971

MSC-12393

Raft is easily deployed and highly maneuverable in water. It has false bottom of water ballast containers attached to underside, making it exceptionally stable platform from which swimmers can operate. Raft is attachable to external moorings.

B71-10192

ANALYTICAL METHODS FOR BACTERIAL KINETICS STUDIES

EDWARDS, V. E. WILKE, C. R.

JUN. 1971 SEE ALSO UCRL-16398

LRL-10011

Methods utilize mathematical equations and models and specialized computer techniques. Techniques apply to food production, complex chemicals production, and polluted water purification.

B71-10200

INERTIA DIAPHRAGM PRESSURE TRANSDUCER

SEEGMILLER, H. L. B.

JUN. 1971

XAC-2981

Transducer measures gas pressure profiles in high temperature, short duration, gas flows usually found in devices where pressure pulses may have durations of few microseconds to several milliseconds. Assembly includes fluid delay line, delay chamber, and flow restrictor for equalizing steady state pressure on diaphragm's sides

B71-10202

ATTITUDE CONTROLS FOR VTOL AIRCRAFT

PAULI, F. A.

JUN. 1971 SEE ALSO NASA-TN-D-5715

XAC-8972

Systems consist of single duct system with two sets of reaction control nozzles, one linked mechanically to pilot's controls, and other set driven by electric servomotors commanded by preselected combinations of electrical signals.

B71-10241

TILT TABLE FOR ERGOMETERS AND OTHER BIOMEDICAL DEVICES

GAUSE, R. L. SPIER, R. A.

JUL. 1971

M-PS-21010

Table adjusts to any position between horizontal and vertical. Apparatus includes - floor plate, plate hinged to floor plate, for carrying ergometer, hydraulic cylinder and piston on plate sides, linking them, hydraulic system, positive stops, padded backrest and headrest, one hand controls, and constraint system.

B71-10312

INSTRUMENT DETECTS BACTERIAL LIFE FORMS

PLAKAS, C./BIOSPHERICS RES., INC./

AUG. 1971

GSFC-10972

Instrument assays enzymatic bioluminescent reaction that occurs when adenosine triphosphate /ATP/ combines with luciferase and luciferin. Module assembly minimizes need for hardware associated with reaction fluid and waste transfer. System is applicable in marine biology and aerospace and medical fields.

B71-10316

VISCOELASTIC CUSHION FOR PATIENT SUPPORT

SAUERS, D. G.

AUG. 1971

MSC-12447

Flexible container, filled with liquid, provides supportive device which conforms to patient's anatomy. Uniform cushion pressure prevents formation of decubitus ulcers, while the porous sponge substructure damps fluid movement through cushion response so that patient is not dumped when his weight shifts.

B71-10329

A SYSTEM FOR THE AUTOMATIC MEASUREMENT AND DIGITAL DISPLAY OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURES

SCHULZE, A. E./TEX. UNIV./

AUG. 1971

MSC-13227

Basic components of system are - occluding cuff with mounted cuff microscope, cuff pump deflator, pressure transducer, preamplifier unit, electrocardiograph machine, an analog to digital convertor unit, and digital display unit. System utilizes indirect auscultatory method, based on Korotkoff sounds, for measurement.

B71-10330

NEW METHOD SPEEDS BODY INERT GAS SATURATION AND UTILIZES SURFACE DECOMPRESSION

EDEL, P. O./J. AND J. MARINE DIVING CO., INC./

AUG. 1971

MSC-13543

Method reduces required saturation time from three days to six hours and also reduces required decompression time. Waiting time for planning underwater research is therefore reduced, and emergency surfacing is possible.

B71-10332

THE DETERIORATION OF INTERMEDIATE MOISTURE FOODS

LABRUZA, T. P./MIT/

AUG. 1971

MSC-13827

Deteriorative reactions are low and food quality high if intermediate moisture content of a food is held at a water activity of 0.6 to 0.75. Information is of interest to food processing and packaging industry.

B71-10355

CADMIUM PLATED STEEL CAPS SEAL ANODIZED ALUMINUM FITTINGS

PADDEN, J./CHRYSLER CORP./

SEP. 1971

M-PS-20137

Cadmium prevents fracturing of hard anodic coating under torquing to system specification requirements, prevents galvanic coupling, and

eliminates need for crush washers, which, though commonly used in industry, do not correct leakage problem experienced when anodized aluminum fittings and anodized aluminum cap assemblies are joined.

**B71-10387**  
TREATMENT OF BLUEBERRIES PRIOR TO FREEZE DEHYDRATION  
LARSON, R. W./WHIRLPOOL CORP./  
OCT. 1971  
MSC-13573

Softening blueberry skin by treatment with weak solution of sodium hydroxide prior to freeze dehydration prevents tough, chewy skins upon rehydration.

**B71-10466**  
METABOLIC BREATH ANALYZER  
PERRY, C. L.  
DEC. 1971  
M-PS-21415

Instrument measures metabolic breathing rate and dynamics of human beings in atmospheres ranging from normal air to 100 percent oxygen at ambient pressures from 14.7 to 3.0 psia. Measurements are made at rest or performing tasks up to maximum physical capacity under either zero or normal gravity.

**B71-10475**  
IMPROVED VACUUM PROBE COLLECTS SURFACE-CONTAMINATION SAMPLES  
ZAHlava, B. A./BECKTON, DICKENSON, AND CO./  
DEC. 1971 SEE ALSO B68-10231 NASA-CR-111796  
LANGLEY-10623

Redesigned vacuum-probe surface sampler, consisting of wand with disposable probe and filter assembly, collects specimens of fallout and handling contamination.

**B71-10476**  
EYE POINT-OF-REGARD SYSTEM  
JEX, R. R./SYSTEMS TECHNOL., INC./  
DEC. 1971  
ARC-10360

System measures intersection of line of sight and eye point of regard /EPR/ for a human operator in visual scanning system. Device measures two head to reference angles with EPR system and adds them with eye to head angles, yielding a dc signal proportional to picture plane coordinates.

**B71-10477**  
MINIATURE BATTERY-OPERATED ELECTROMAGNETIC SYSTEM FOR BLOOD FLOW MEASUREMENTS  
FRYER, T. B.  
DEC. 1971  
ARC-10362

System consisting of solid state electronics package and a pair of standard flow-transducer cuffs is useful in cardiovascular studies. Device shows good zero stability and calibrations, and low noise levels.

**B71-10485**  
IMPROVED ORTHOPEDIC ARM JOINT  
DANE, D. H.  
DEC. 1971  
M-PS-21611

Joint permits smooth and easy movement of disabled arm and is smaller, lighter and less expensive than previous models. Device is interchangeable and may be used on either arm at the shoulder or at the elbow.

**B71-10487**  
MICROORGANISM SAMPLE DEVICE  
REED, L. L./LOCKHEED MISSILES AND SPACE CO./ SMITH, J. M.  
DEC. 1971 SEE ALSO B69-10223  
LANGLEY-10258

Device, based on gel-impingement technique, collects microorganism specimens from circulating air streams. Device is useful to air pollution studies involving the collection of airborne microbial specimens.

**B71-10495**  
REUSABLE ANAEROBIC SYSTEM FOR MICROBIOLOGICAL STUDIES

- A CONCEPT  
MURAWCZYK, C./MARTIN MARIETTA CORP./  
DEC. 1971  
MSC-13920

Simple, low cost system consists of semirigid incubation chamber with clear Teflon window, airtight zipper and internal compartments for petri dishes or microbial plates. Device interests schools, medical laboratories, and manufacturers of biological and pharmaceutical supplies.

**B71-10521**  
DEVELOPMENT OF NON-SWEET, FLAVORED FOOD CUBES  
LARSON, R. W./WHIRLPOOL CORP./  
DEC. 1971  
MSC-14002

Food cubes exhibit flavor and quality stability for periods of four weeks in 100 deg F environment. They are suitable for field rations, emergency rations or snacks and should interest the food processing industry.

## 06 MECHANICS

**B71-10044**  
PREVENTION OF DAMAGE TO DELICATE CONNECTORS DURING MOUNTING OF HEAVY ENGINES FOR TESTING  
HENDRICKSON, R. J./AEROJET-GEN. CORP./  
MAR. 1971  
NUC-10322

Air-bearing-pad principle, combined with monitoring system of the air-bearing force, prevents damage between electrical and mechanical connectors joining a large engine system to the test stand during remote mating. Pad provides a cushion between engine and test stand.

**B71-10074**  
PREDICTION OF WINDAGE POWER LOSS IN ALTERNATORS  
FRANCIK, J. E.  
APR. 1971 SEE ALSO NASA-TN-D-4849  
LEWIS-10939

Simplified equations and constants, based on laminar and turbulent flow theory between parallel plates, estimate windage loss in rotating electrical machinery. Comparison of calculated results and experimental data for smooth cylindrical rotor and slotted alternator yields 7 percent maximum variation between calculated and experimental data.

**B71-10093**  
PIPE INSTALLATION TECHNIQUE AVOIDS DISTURBING WORK AREAS  
MALYSZ, E. F./N. AM. ROCKWELL CORP./  
MAY 1971  
MSC-15581

Pipe supports for 0.305 m diameter pipes are pre-hung and an opening is cut in exterior wall of the building. Pipes are welded outside the building and then rolled through the opening into the final location. Technique affords cost and time savings.

**B71-10094**  
DETERMINATION OF GAS VOLUME TRAPPED IN A CLOSED FLUID SYSTEM  
HUNTER, W. F./N. AM. ROCKWELL CORP./ JOLLEY, J. E.  
MAY 1971  
MSC-15685

Technique involves extracting known volume of fluid and measuring system before and after extraction, volume of entrapped gas is then computed. Formula derived from ideal gas laws is basis of this method. Technique is applicable to thermodynamic cycles and hydraulic systems.

**B71-10095**  
UNIFIED HATCH SYSTEM  
HART, R. J./N. AM. ROCKWELL CORP./ WALKOVER, L. J.  
ZOSKY, E. W.  
MAY 1971  
MSC-15813

Special hatch sealing mechanism design increases

safety, reliability, and convenience. Adaptations are possible for oceanographic and high-speed aircraft design, or for any system where quick-opening pressure hatch is required. In normal mode, hatching mechanism is manually operated from either side.

B71-10103

# **METHYL ALCOHOL USED AS PENETRANT INSPECTION MEDIUM FOR POROUS MATERIALS**

HENDRON, J. A./AEROJET-GEN. CORP./

MAY 1971

NUC-10419

Porous material thoroughly wetted with alcohol shows persistent wet line or area at locations of cracks or porosity. Inspection is qualitative and repeatable, but is used quantitatively with select samples to grade density variations in graphite blocks. Photography is employed to achieve permanent record of results.

B71-10109

# **THE HEAT PIPE - A SIMPLE, VERSATILE, EFFICIENT HEAT TRANSFER TOOL**

SCHWARTZ, J.

MAY 1971

NPO-11598

Heat pipe transports large quantities of heat from source to sink with only small temperature drop. Thermal energy is transferred to and from heat pipe by any combination of conduction, convection, or radiation heat transfer. Pipes transport energy from open flames, nuclear sources, and electronic equipment.

B71-10129

# **LOCATING TUBE BLOCKAGE THAT X-RAY CANNOT DETECT**

HENDRON, J. A./AEROJET-GEN. CORP./

MAY 1971

NUC-10386

Alternate choices to X-ray use in detecting foreign materials in metal assemblies are available, including negative radiography, neutron radiography, liquid-crystal inspection and ultrasonics. Advantages and disadvantages of each method are given. Report is valuable in testings and inspections, including heat exchangers and piping systems.

B71-10150

# **PREDICTING VIBRATIONAL FAILURE OF FLEXIBLE DUCTING**

HENRY, R. H./N. AM. ROCKWELL CORP./

JUN. 1971

M-FS-16750

Technique applies to liquid or gas transfer through flexible ducting and proves valuable in high velocity fluid flow cases. Fluid mechanism responsible for free bellows vibrational excitation also causes flexible hose oscillation. Static pressure stress influences flexible ducting fatigue life and is considered separately.

B71-10156

# **INSTRUCTION MANUALS FOR RADIOGRAPHIC NONDESTRUCTIVE TESTING**

INNOVATOR NOT GIVEN /GEN. DYN./CONVAIR/ JUN. 1971

SEE ALSO B67-10374, B68-10391, B69-10108, B69-10278,

NASA-CR-61212, NASA-CR-61213, NASA-CR-61214,

NASA-CR-61215, NASA-CR-61216, NASA-CR-61231

M-FS-21350

Six new handbooks on the fundamentals of nondestructive test techniques supply recent information for instructing inspectors and technicians, and can be used effectively in shops or laboratories, technical schools, or home study programs.

B71-10183

# **GENERALIZED SAFETY EQUATION - A CONCEPT**

HANO, G./IBM CORP./

JUN. 1971

M-FS-20522

Concept provides definition of relationship between safety and reliability, personnel safety measurement, and equipment safety evaluation. Safety systems cope with single or combined risks. Cost and effectiveness of alternate hypothetical safety systems are estimated and

used as basis for final system design.

B71-10187

# **PATTERN RECOGNITION TECHNIQUE**

HONG, J. P.

JUN. 1971

NPO-11337

Technique operates regardless of pattern rotation, translation or magnification and successfully detects out-of-register patterns. It improves accuracy and reduces cost of various optical character recognition devices and page readers and provides data input to computer.

B71-10188

# **PEAK STRUCTURAL RESPONSE TO NONSTATIONARY RANDOM EXCITATIONS**

SHINOZUKA, M. YANG, J.-N.

JUN. 1971

NPO-11617

Study establishes distribution function of peak response values, based on frequency interpretation. Excitations considered include impact loading on landing gears and aircraft gust loading. Because of relative severity of excitations, prediction of fatigue and maximum response characteristics is important part of task of structural analysis and design.

B71-10189

# **ANALYTICAL PROCEDURE FOR ESTIMATING RELIABILITY OF RANDOMLY EXCITED STRUCTURES**

HEER, E. YANG, J.-N.

JUN. 1971

NPO-11618

Analysis considers statistical variation of material strength and interactions between catastrophic and failure fatigue modes. Procedure employs concepts of fracture mechanics and extreme point processes associated with stationary narrow-band random vibrations.

B71-10194

# **PREDICTING SERVICE LIFE MARGINS**

EGAN, G. F./N. AM. ROCKWELL CORP./

JUN. 1971

M-FS-24015

Margins are developed for equipment susceptible to malfunction due to excessive time or operation cycles, and for identifying limited life equipment so monitoring and replacing is accomplished before hardware failure. Method applies to hardware where design service is established and where reasonable expected usage prediction is made.

B71-10196

# **LIMITED LIFE ITEM MANAGEMENT**

EAGLEN, R. L./N. AM. ROCKWELL CORP./

JUN. 1971

M-FS-24020

Plans are available for age-sensitive hardware management. Control plan identifies shelf life or age control requirements for materials considered age sensitive, use sensitive, or time service or shelf life controlled items, and describes methods of arriving at age controls through adherence to detailed specifications.

B71-10227

# **ULTRASONIC SCANNING SYSTEM FOR IN-PLACE INSPECTION OF BRAZED-TUBE JOINTS**

HARALSON, H. S./SPACO, INC./ HATHES, J. L. WAGES, C. G.

JUL. 1971 SEE ALSO NASA-TN-X-64558

M-FS-21166

System detects defects of .051 cm in diameter and larger. System incorporates scanning head assembly including boot enclosed transducer, slip ring assembly, drive mechanism, and servotransmitter. Ultrasonic flaw detector, prototype recorder, and special recorder complete system.

B71-10254

# **WIND TUNNEL INVESTIGATIONS AT TRANSONIC MACH NUMBERS**

ROBERTSON, J. E./WYLE LABS./

JUL. 1971

M-FS-20895

Investigation utilizes static and fluctuating pressure measurements and oil flow visualization techniques to analyze perturbed flow environments of three-dimensional protuberances and the surrounding structure. Significant findings are given.

B71-10266

CRITERIA FOR VIBRATION TESTING  
CHONIN, D. L./TRW SYSTEMS GROUP/  
AUG. 1971  
GSFC-10737

Systematic application of response spectral analysis and other analyses determine damping sensitivity of flight environment and candidate laboratory tests. Computerized comparison is made between response spectrum for flight environment, or enveloping spectra for collection of flight events, and response spectrum for candidate laboratory test.

B71-10270

METHOD FOR DETERMINING FAILURE POTENTIAL OF PRESSURE VESSELS

RAWE, R. A./MCDONNELL DOUGLAS CORP./ SCHWAB, D. E.  
AUG. 1971  
M-FS-20564

Method provides quantitative estimation of critical vessel wall and crack parameters that must not be exceeded to ensure against failure of pressurized vessels.

B71-10271

QUALIFICATIONS AND CERTIFICATION OF NONDESTRUCTIVE TESTING PERSONNEL

KIRK, H. K.  
AUG. 1971 SEE ALSO B67-10374, B68-10391, B69-10108, B69-10278  
M-FS-20850

Personnel handbook states criteria for test methods including radiation, ultrasonics, eddy current, liquid penetrant, and magnetic particle. Subject categories are thoroughly defined and substructured.

B71-10281

INFORMATION QUALITY-CONTROL MODEL  
VINCENT, D. A.  
AUG. 1971  
NPO-11431

Model serves as graphic tool for estimating complete product objectives from limited input information, and is applied to cost estimations, product-quality evaluations, and effectiveness measurements for manpower resources allocation. Six product quality levels are defined.

B71-10327

STRUCTURAL BEHAVIOR OF TAPERED INFLATED FABRIC CYLINDERS UNDER VARIOUS LOADING CONDITIONS  
KOVALEVSKY, L./N. AM. ROCKWELL CORP./ RISK, P. L.  
AUG. 1971  
MSC-15317

Method analyzes inflatable structures and considers axial loads, torsional moment, and internal pressure. Behavior depends on anisotropic nature and large deflection stress-strain characteristics of fabric material. Behavior equations for pressurized cylinder loaded in torsion are developed.

B71-10337

IMPROVED SMOKE GENERATOR FOR LOW-SPEED WIND TUNNELS  
TURNER, T. R.  
SEP. 1971  
LANGLEY-10885

Device incorporates kerosene vaporization concept by electrically heating tubes that carry kerosene down the probe, smoke is emitted from orifices at probe's end. Neither the low concentration of kerosene vapor nor the 50 Vdc power supply constitutes a safety hazard.

B71-10348

ACCELERATED BATTERY-LIFE TESTING - A CONCEPT  
MC CALLUM, J./BATTELLE MEM. INST./ THOMAS, R. E.  
SEP. 1971 SEE ALSO NASA-CR-97935, NASA-CR-107114  
GSFC-11085

Test program, employing empirical, statistical and

physical methods, determines service life and failure probabilities of electrochemical cells and batteries, and is applicable to testing mechanical, electrical, and chemical devices. Data obtained aids long-term performance prediction of battery or cell.

B71-10397

EQUIPMENT AND PROCEDURE FOR DETERMINING THE ELASTIC MODULUS OF CARBON-EPOXY COMPOSITES

BROWN, W. L./MARTIN MARIETTA CORP./ FELDMAN, A.  
PENNING, P. A. STANG, D. A.  
OCT. 1971  
LEWIS-11116

Method includes test device design and fabrication and standard Naval Ordnance Laboratory /NOL/ test ring as the test specimen. Technique provides accurate measurement of NOL ring elastic modulus, and adapts for use with fiber glass epoxy/rings.

B71-10405

COMBINED HIGH VACUUM/HIGH FREQUENCY FATIGUE TESTER

HONEYCUTT, C. R./TRW, INC./ MARTIN, T. P.  
OCT. 1971 SEE ALSO NASA-CR-72241  
LEWIS-11210

Apparatus permits application of significantly greater number of cycles or equivalent number of cycles in shorter time than conventional fatigue test machines. Environment eliminates problems associated with high temperature oxidation and with sensitivity of refractory alloy behavior to atmospheric contamination.

B71-10407

LOW COST, LOGARITHMIC MASS FLOW COMPUTER

DOLCE, J. L. GABV, J. D., JR. NOGA, D. F. WATSON, J. E.  
NOV. 1971  
LEWIS-11001

Computer solves the equation relating gas flow through a nozzle, venturi, or orifice to the absolute temperature, absolute pressure, and differential pressure of the fluid. Inexpensive method has high frequency response and provides true analog output.

B71-10409

SINGLE TWO-SPEED TAPE TRANSPORT DRIVE

CLURMAN, S. P./RCA/ STITLEY, G. L.  
NOV. 1971 SEE ALSO NASA-CR-112400  
GSFC-10981

High data rate storage system B tape transport fits to existing hysteresis motor thus reducing flutter, lowering assembly cost, simplifying assembly process and increasing reliability. Motor may be used on any tape recorder or similar device having two speed ratio of up to 32 to 1.

B71-10430

SERVO-CONTROLLED DECOUPLER ELIMINATES OSCILLATIONS IN FLUID FLOW - A CONCEPT

FENWICK, J. R./N. AM. ROCKWELL CORP./  
NOV. 1971  
M-FS-18793

Active control technique, using accelerometer-controlled servovalve to operate a compensating piston, effectively eliminates pressure fluctuations due to longitudinal structural vibration within a relatively long bandwidth.

B71-10446

AXISYMMETRIC AND CYLINDRICAL ISOSTABLE STRUCTURES - A CONCEPT

HEDGEPEATH, J. M./ASTRO RES. CORP./ PREISWERK, P.  
SCHEURCH, H. U.  
NOV. 1971  
NPO-12049

Mathematical formulation, suitable for analytical design of structural networks with uniform local stability, yields idealized solutions for specific two-family networks.

B71-10507

NONDESTRUCTIVE TESTING OF BOND INTEGRITY IN FOAM INSULATION/ALUMINUM COMPOSITES

BANKSTON, B. P. CLOTFELTER, W. M. DUREN, P. C.  
DEC. 1971 SEE ALSO NASA-TM-X-53940  
M-FS-20786

Nondestructive test methods are used for evaluating bond integrity of low-density polyurethane spray-on foam used as cryogenic insulation on aluminum alloy surfaces.

**B71-10513**  
**OPTICAL INSPECTION TOOL FOR INTERIOR SURFACES OF FLUID LINES**  
 MITCHELL, D. K.  
 DEC. 1971  
 M-FS-15162

Specialized tool enables visual inspection of interior bore surfaces of pipe lines having sharp bends and blind runs. Adjustable, hinged optical head permits viewing of bore surfaces at angles from 0 deg to 115 deg to the principal axis of the sight tube.

**B71-10514**  
**METHOD FOR CALCULATING THE STRESSES IN PRESSURE VESSELS**  
 SKOGH, J./LOCKHEED MISSILES AND SPACE CO./  
 DEC. 1971  
 MSC-13515

Calculation of elastic and plastic stresses at axisymmetric discontinuities is based on nonlinear elastic theory incorporating pressure coupling effects.

**B71-10528**  
**SPLIT STATOR VANE ROW FOR FANS AND COMPRESSORS**  
 VOLK, L. J./GE/  
 DEC. 1971 SEE ALSO NASA-CR-1493  
 ARC-10288

Operating noise of fans is reduced by adding part span vanes to vane row of stator, reducing the number of full span vanes and maintaining a vane-to-blade ratio of about 2 to 1.

## 07 MACHINERY, EQUIPMENT, AND TOOLS

**B71-10012**  
**WELDED POLYPROPYLENE LINERS FOR LARGE DESCALING TANKS**  
 ABEL, H. P./N. AM. ROCKWELL CORP./  
 JAN. 1971  
 M-FS-18711

Liners for nitric and hydrofluoric acid tanks show no sign of deterioration after 18 months of continuous use. Each side of each edge of the polypropylene sheets is chamfered, and sheets are welded from both sides with polypropylene filler rod and a special hot-air welding torch.

**B71-10018**  
**VACUUM-JACKETED ROTARY JOINTS FOR PIPELINES**  
 MURSINNA, R. C./AMETER, INC./  
 FEB. 1971 SEE ALSO NASA-CR-107244  
 KSC-10519

Joint absorbs all significant torque, is as rugged as heavy metallic pipe, and has thermal insulation comparable to length of flexible pipe. Design is adaptable to any pipes transporting gases or liquids, including those which are noxious or corrosive.

**B71-10020**  
**STUDY AIDS ACCURACY OF TURBOPUMP AXIAL THRUST ANALYSIS**  
 NIELSON, C. E./N. AM. ROCKWELL CORP./  
 JAN. 1971  
 M-FS-18774

Test program to verify theory used in calculating axial thrust uses turbopump instrumented with a/ proximity transducers for measuring shaft position, b/ a strain gage thrust bearing carrier to measure axial thrust, and c/ internal pressure taps to define component pressure gradients used in thrust calculations.

**B71-10023**  
**PEAK WIND SPEED ANEMOMETER /MAXOMETER/**  
 CAMP, D. W. KAUFMAN, J. W. TURNER, R. E.  
 JAN. 1971  
 M-FS-20916

Peak wind speed recording device, which employs a drag disk with two constant-rate springs /high

and low/ and a precision clutching mechanism, measures wind speeds from 8 m/sec up to 200 m/sec while retaining permanent record of peak wind. Device withstands temperatures up to 810 K.

**B71-10067**  
**CHATTER-FREE CHECK VALVE - A CONCEPT**  
 DUNBAR, J. E./BENDIX CORP./  
 APR. 1971  
 MSC-13262

Valve head moves in spiral motion away from seat. Motion is controlled by travel of pin along spiral groove in valve guide. Clearances between pin and groove permit free motion of valve, but effectively dampen vibration and chattering.

**B71-10072**  
**SYSTEMS FOR DEAD-RECKONING NAVIGATION AND FOR SIMULATION OF INSTRUMENTAL ERROR - CONCEPTS**  
 GREEN, W. L.  
 APR. 1971 SEE ALSO NASA-TN-X-53953  
 M-FS-20860

Navigational system for manned lunar vehicles is intended for travel totaling 30 km within 5 km of home base, total distance traveled must be indicated with 2 percent accuracy. Hardware includes two two-degrees-of-freedom gyroscopes, odometers, tachometers, and signal processing equipment.

**B71-10080**  
**HIGH-RELIABILITY RELEASE MECHANISM**  
 PARADISE, J. J./LOCKHEED MISSILES AND SPACE CO./  
 MAY 1971  
 LEWIS-11233

Release mechanism employing simple clevis fitting in combination with two pin-pullers achieves high reliability degree through active mechanical redundancy. Mechanism releases solar arrays. It is simple and inexpensive and performs effectively. It adapts to other release-system applications with variety of pin-puller devices.

**B71-10081**  
**PNEUMATIC AMPLIFIER CONTROLS HIGH PRESSURE FLUID SUPPLY**  
 JOHNSON, H. L. TRADER, A. G.  
 APR. 1971  
 MSC-12121

Pneumatic servo system has pneumatic amplifier containing novel control valve that provides linear control of the flow rate. Fluid supply is isolated from control pressure.

**B71-10083**  
**FLUID SLIP RING TRANSFERS COOLANT TO ROTATING EQUIPMENT**  
 MAINS, D. K./LOCKHEED ELECTRON. CO./  
 APR. 1971  
 MSC-13451

Rotating fluid coupler, consisting of rotor and housing made of aluminum, that is concentric with electrical slip-ring assembly, transfers cooling fluid to instrumentation undergoing environmental tests on rotating platform. Rotating fluid coupler permits unlimited platform revolutions and eliminates danger of lines being pulled loose from supplies.

**B71-10098**  
**HIGH-TEMPERATURE, LONG-LIFE POLYIMIDE SEALS FOR HYDRAULIC ACTUATOR RODS**  
 JOHNSON, R. L. LEE, J./FAIRCHILD HILLER CORP./ LOONIS, W. R.  
 MAY 1971 SEE ALSO NASA-TN-X-52888, NASA-CR-72563  
 LEWIS-11212

Two types of polyimide seals are developed for hydraulic actuator rod in low pressure second stage of two-stage configuration. Each seal meets test objectives of twenty million cycles of operation at 534 K. Analytical and experimental study results are discussed. Potential applications are given.

**B71-10100**  
**HIGH-TEMPERATURE PUMP-MOTOR ASSEMBLY**  
 COLKER, C./AEROJET-GEN. CORP./ WALDRON, W.  
 MAY 1971 SEE ALSO NASA-CR-72823, NASA-CR-72824  
 LEWIS-10256

Assembly pumps liquid sodium-potassium /NaK/ eutectic at 950 K for up to 20,000 hours. Design features include - high operating-temperature capability, zero leakage, process fluid lubricant/coolant, insulation system compatible with ionizing radiation environments, and reliability and long life without maintenance.

B71-10101

REMOTE COUPLING OF AIR LINES  
FUCHS, C. E./WESTINGHOUSE ASTRONUCL. LAB/  
MAY 1971  
NUC-10225

Bullseye coupler is projected pneumatically from one railroad car at the second car's point of connection. System depends on assumption that inaccuracies in relative position of cars do not exceed certain limits. System is useful to oil drilling, marine rescue and salvage, nuclear work and chemical plant operations.

B71-10140

IMPROVED TRANSDUCER FOR SQUEEZE-FILM BEARINGS  
HOOGENBLOOM, L./HECH. TECHNOL., INC./  
MAY 1971 SEE ALSO B66-10226, B68-10180  
M-PS-20826

Transducer amplifies vibrations produced by piezoelectric drivers, creating greater amplitudes than were possible with direct drive devices. Drivers isolated from bearing surfaces result in bearings with high axial load capacity and stiffness, thus, wear on ceramic cylinders is reduced.

B71-10146

SIMPLE, SHOCK-FREE, QUICK RELEASE CONNECTOR - A CONCEPT  
JEWETT, H. R., JR.  
MAY 1971  
LEWIS-11178

Connector concept is based on characteristics of friction between sliding surfaces and consists of two packs of foil strips. Advantages of this connector are - separation is smooth and shock-free, and connector can also act as a seal. Equation for computing tensile load-carrying capability is also given.

B71-10152

AN INVESTIGATION OF TANDEM-ROW, HIGH-HEAD PUMP INDUCERS  
ETTER, R. J./HYDRONAUTICS, INC./  
JUN. 1971 SEE ALSO NASA-CR-110790  
M-PS-21139

Investigation results indicate optimum design is tandem inducer system using supercavitating first stage and subcavitating second stage operating over wide range of suction specific speeds and flow coefficients. Fluid-flow cavitation effects theory and experimental results also apply to other fluid power system designs.

B71-10159

A LIGHTWEIGHT, HIGH OUTPUT SOIL SAMPLER  
HOWARD, E. A. INUS, R. E. STOCKWELL, D. W.  
JUN. 1971  
NPO-10797

Sampler is useful on or under earth's surface or on sea bottom. Larger sample amount is obtained relative to sampler size and weight and limited particle size sample material is continuously delivered. Silicone rubber liner in transport tube nearly eliminates grinding or particulate processing during sampling, and reduces required torque.

B71-10173

SERIES-HYBRID BEARING - AN APPROACH TO EXTENDING BEARING FATIGUE LIFE AT HIGH SPEEDS  
ANDERSON, W. J. COE, H. R. FLEMING, D. P. PARKER, R. J.  
JUN. 1971 SEE ALSO NASA-TN-D-7011  
LEWIS-11152

Fluid film bearing of hybrid device consists of orifice compensated annular thrust bearing and self-acting journal bearing. In series hybrid bearing, both ball bearing and annular thrust bearing carry full system thrust load, but two bearings share speed. Operation of system is

stable and automatically fail-safe.

B71-10175

RECOMMENDED SAFETY GUIDES FOR INDUSTRIAL LABORATORIES AND SHOPS  
ALLISON, W. W.  
JUN. 1971 SEE ALSO SC-M-68-378  
SAN-10050

Booklet provides references to 29 publications providing information on hazard control and approved safety practices. Areas include pressurized gas and vacuum systems. Guidelines are presented for safeguarding facilities where machinery, equipment, electrical devices, or hazardous chemicals are used.

B71-10178

WALL ATTACHMENT, FLUERIC CROSSOVER "AND" GATE  
HELLBAUM, R. F.  
JUN. 1971  
XLA-07391

Gate performance is not adversely affected by normal dimensional variations encountered in fabrication and it operates throughout full loading range. Flow from one control must be sufficiently monostable to allow initial attachment and upon switching, return to outer wall. Venting must be adequate.

B71-10207

HYDROSTATIC LIQUID-BEARING FOR PRECISION GYRO  
SGAMBATI, R. J./BENDIX CORP./  
JUL. 1971 SEE ALSO NASA-CR-102991  
M-PS-21138

Unit with 2W power increase and slightly larger overall dimensions performs as well as or better than its gas-bearing counterpart. Liquid-bearings are built by reworking serviceable gas-bearing components /sleeves, endplates, and cylinders/. Hydrostatic bearing is self-centered, requiring no magnetic suspension or centering jewel.

B71-10214

DEVICE PREPARES ALUMINUM SURFACES FOR WELDING  
FABLKNER, G. E./IIT RES. INST./ SAPERSTEIN, Z. P.  
JUL. 1971  
M-PS-20750

Dry machining technique removes original surfaces to obtain contamination free welding surface. Device straddles edge being prepared and aligns with existing edges and adjacent surfaces of workpiece while sensing device regulates cut depth. Description of prototype is given.

B71-10219

SUBMERGED GAS INJECTOR EXPELS CRYOGENIC LIQUIDS FROM TANKS  
CONRAD, E. W. JOHNSON, W. R.  
JUL. 1971 SEE ALSO NASA-TN-D-4102  
LEWIS-11231

Vaporizing small portion of cryogenic liquid into pressurizing gas reduces amount of pressurizing gas required to expel cryogenic liquid from tank. Specific example of injecting helium gas, stored at same temperature of liquid hydrogen, through submerged porous plate directly into liquid hydrogen is described.

B71-10222

VARIABLE-AREA NOZZLE AUTOMATICALLY CONTROLS FLUID FLOW  
CONRAD, E. W.  
JUL. 1971  
LEWIS-11217

Simple, passive nozzle requires no active control system to vary injection area. Injection area changes with changing pressure, thereby allowing greater flow as pressure increases. As pressure drop across nozzle is decreased, spring action of segments causes them to move inward, decreasing the flow area.

B71-10233

HYDRAULIC ACTUATOR MOTION LIMITER ENSURES OPERATOR SAFETY  
STEINHETZ, C. P.  
JUL. 1971  
ARC-10131

Device regulates action of hydraulic linkage to control column to minimize hazard to operator.

Primary components of device are flow rate control valve, limiter accumulator, and shutoff valve. Limiter may be incorporated into other hydraulic systems to prevent undue wear on hydraulic actuators and associated components.

B71-10237

PORTABLE LIGHTWEIGHT BANDSAW  
SEARLE, H. J./N. AM. ROCKWELL CORP./  
JUL. 1971

M-PS-16927

Bandsaw of aluminum-6061 weighs about five kg and is operable by one or two men. Spiral blade cuts in any direction and at any angle. Hardness of materials to be cut is limited by material and dimension of blade.

B71-10239

IMPROVED METHOD FOR CALCULATING PUMP THERMODYNAMIC SUPPRESSION HEAD  
KAGEYAMA, Y.  
JUL. 1971

M-PS-20852

Method of calculation improves by introducing the sound velocity of two phase flow into the equation for the vapor to liquid volume ratio. Comparisons of required net positive suction head and thermodynamic suppression head are made for a head coefficient ratio of 0.98.

B71-10301

HIGH MOBILITY WORK STATION RESTRAINT SUPPORT  
SCHERMEKHORN, R. S.  
AUG. 1971

MSC-12419

Chair holds man in semistanding posture enabling astronauts to work comfortably with minimum restriction in weightless environment. Seat, angled at 130 deg to back support, twists and swivels up to 20 deg in all directions but forward. Two flexible thigh clips prevent occupant from slipping off.

B71-10302

HOT TAP THERMOWELL INSTALLATION  
ROMERO, C. A.  
AUG. 1971

MSC-12427

System permits valve housings or other fillings to be installed in live steam lines or water pipes without interrupting their operation, thus eliminating current tapping restrictions. Two basic assemblies for installation under pressure are described.

B71-10315

REDUCTION OF VALVE LEAKAGE - A CONCEPT  
DOSHI, N. H./TRW SYSTEMS, INC./ SALVINSKI, R. J.  
AUG. 1971

NPO-12003

Leakage elimination occurs by increasing pressure on poppet seat, heating poppet plunger or cooling valve body, and then exerting force between 4.45 and 44.5 kN at poppet seat interface. Valves are useful in handling of corrosive fluids.

B71-10328

HERMETICALLY SEALED MOTION TRANSMITTER  
ECKERT, R. L./N. AM. ROCKWELL CORP./  
AUG. 1971

MSC-17348

Transmitter allows transmission of rotational or single planar arc motion through hermetically sealed chamber without use of dynamic seals or complex mechanisms. Device may interest pressure vessel designers and those who need to isolate equipment from a hostile environment.

B71-10358

IMPROVED DIAMOND CORING BITS DEVELOPED FOR DRY AND CHIP-FLUSH DRILLING  
DECKER, W. E./WESTINGHOUSE ELEC. CORP./ HAMPE, W. R.  
SEP. 1971

M-PS-21111

Two rotary diamond bit designs, one operating with a chip-flushing fluid, the second including auger section to remove drilled chips, enhance usefulness of tool for exploratory and industrial

core-drilling of hard, abrasive mineral deposits and structural masonry.

B71-10412

ULTRATHIN GATE VALVE FOR HIGH VACUUM OPERATION  
UGIANSKY, R. J.  
NOV. 1971

GSFC-11028

Thin, compact, high-vacuum gate valve used to join two vacuum systems together demonstrates multiple operation reliability. Valve measurements and non-protruding handle make valve usable in confined areas.

B71-10449

LIQUID-FUEL VALVE WITH PRECISE THROTTLING CONTROL  
MC DOUGAL, A. R. PORTER, R. N. RIEBLING, R. W.  
NOV. 1971

NPO-10808

Prototype liquid-fuel valve performs on-off and throttling functions in vacuum without component cold-welding or excessive leakage. Valve design enables simple and rapid disassembly and parts replacement and operates with short working stroke, providing maximum throttling sensitivity commensurate with good control.

B71-10468

PROPORTIONAL PULSED PILOT VALVE  
RUSK, S. J./LOCKHEED MISSILES AND SPACE CO./  
DEC. 1971

ARC-10228

Proportional pulsed pilot valve using conventional efficient solenoid valve for pilot stage provides proportional thrust control for cold gas thrusters with zero leakage of main stage.

B71-10479

LASER DEVICE PROVIDES ACCURATE REFERENCE TO TRUE GRAVITATIONAL VERTICAL  
BILLMAN, K. W. LEONARD, E. T./DOT/  
DEC. 1971

ARC-10444

Modification of conventional laser provides correct gravitational alignment by utilizing surface pool of mercury as a gravity-sensitive cavity mirror. Laser action is stimulated only when mirrors are normal to the axis of the beam.

B71-10480

TOOL EXPEDITES INSTALLATION OF BNC CONNECTORS  
HARO, P. J.  
DEC. 1971

ARC-10327

Tool is devised which holds BNC connector during installation and permits tightening nut without damaging connector.

B71-10481

DISTRIBUTION AND METERING SYSTEM FOR SOIL SAMPLES  
DEBENHAM, C. H./TRW, INC./  
DEC. 1971

ARC-10429

Electromechanical assembly with movable hopper, commanded to put soil samples into inlet sorts of sampling valves, distributes metered volumes of soil samples into test cells.

B71-10493

AIR LOCK MECHANISM SPEEDS SPECIMEN TESTING IN HIGH-TEMPERATURE VACUUM FURNACES  
WHITEHEAD, C.  
DEC. 1971

LANGLEY-10841

Mechanism, made of 347 stainless steel, is attached to furnace port by bolted flange. Unit incorporates quick opening, high vacuum valve and associated fittings which provide connections to air lock evacuation and to inert gas supply for quenching specimen after it is withdrawn from furnace into air lock.

B71-10496

SCALE FACTOR GAGE FOR FIBER OPTICS INSPECTION DEVICE  
MC MAHON, W./N. AM. ROCKWELL CORP./ SUGG, F. E.  
DEC. 1971

MSC-17361

Flexible wire device, fastened along outside of fiber bundle from viewing portion to tip,

positions calibrated adjustable gage in field of view. Scale factor is determined from known magnification characteristics of fiber optics system or from graduations on gage tip.

B71-10503

METAL-SHEARING ENERGY ABSORBER

PAY, R. J./DENVER UNIV./ WITTRICK, E. P.

DEC. 1971

HQ-10638

Device, consisting of tongue of thin aluminum alloy strip, pull tab, slotted steel plate which serves as cutter, and steel buckle, absorbs mechanical energy when its ends are subjected to tensile loading. Device is applicable as auxiliary shock absorbing anchor for automobile and airplane safety belts.

B71-10511

HYDRAULIC EXPANSION PROCESS SHAPES LARGE METAL SHEETS

ANDERSON, E./GRUMMAN AEROSPACE CORP./

DEC. 1971

MSC-12432

Process imparts dome shape to titanium sheets and is applicable to shaping other metals. Method is of interest to automobile and aircraft body manufacturers.

B71-10516

GLASS TUBE SPLITTING TOOL

KLEIN, J. A./N. AM. ROCKWELL CORP./ MURRAY, C. D.

STEIN, J. A.

DEC. 1971

MSC-17183

Tool accurately splits glass tubing so cuts are aligned 180 deg apart and reassembled tube forms low pressure, gastight enclosure. Device should interest industries using cylindrical closed glass containers.

B71-10522

ANTI-SLIPPING SYSTEM IMPROVES WIRE SAW PERFORMANCE

GALLO, E. A./SERV. TECHNOL. CORP./

DEC. 1971

MSC-13508

System prevents wire saw slippage by providing sufficient friction to turn idler spools even when turns of wire on spools do not provide sufficient friction. Low cost system is easily applied to existing equipment.

## 08 FABRICATION TECHNOLOGY

B71-10028

METHOD OF JOINING METALS OF SIGNIFICANTLY DIFFERENT EXPANSION RATES

CALER, W./ROCKETDYNE/ LA SALLE, P. TRAYLOR, J.

FEB. 1971

NPO-12076

To join a refractory metal to a dissimilar high-temperature metal, braze a section of high elasticity, high ductility metal /such as columbium or columbium alloy/ between the metals to be joined, using a fork-type joint to hold the braze and transition member in place during expansion.

B71-10045

ULTRASONICS USED FOR HIGH-PRECISION NONDESTRUCTIVE INSPECTION OF BRAZED JOINTS

PETERSON, R. M./AEROJET-GEN. CORP./

MAR. 1971

NUC-10352

Technique detects voids greater than or equal to 0.1016 cm in braze depths of 0.254 cm, detecting voids of smaller dimensions is possible. Internal design ensures control of beam's water path length to within 0.635 cm, this length is critical to system's accuracy.

B71-10048

ACCURATE POINTING OF TUNGSTEN WELDING ELECTRODES

ZIEGELMEIER, P

MAR. 1971

ARG-10449

Thoriated-tungsten is pointed accurately and quickly by using sodium nitrite. Point produced is smooth and no effort is necessary to hold the tungsten rod concentric. The chemically produced point can be used several times longer than ground points. This method reduces time and cost of preparing tungsten electrodes.

B71-10050

CONCENTRIC TUBES COLD-BONDED BY DRAWING AND INTERNAL EXPANSION

HYMES, L. C. STONE, C. C.

MAR. 1971

ARG-90033

Metal tubes bonded together without heat application or brazing materials retain strength at elevated temperatures, and when subjected to constant or cyclic temperature gradients. Combination drawing and expansion process produces residual tangential tensile stress in the outer tube and tangential compressive stress in the inner tube.

B71-10060

ROBEL STRIPPER FOR SHIELDED AND UNSHIELDED FLAT CONDUCTOR CABLE

ANGELE, W.

MAR. 1971

M-PS-20120

Stripping tool exposes an area of shield for grounding purposes without removing an area of insulation between terminated shield and exposed conductors. Tool does not require heated blade and is capable of removing small portions of material at a time, to any depth.

B71-10062

THIN SPRAY FILM THICKNESS MEASURING TECHNIQUE

JONES, G. KURTZ, G. W.

APR. 1971

M-PS-20842

Thin spray film application depths, in the 0.0002 cm to 0.002 cm range, are measured by portable, commercially available, light density measuring device used in conjunction with glass plate or photographic film. Method is automated by using mechanical/electrical control for shutting off film applicator at desired densitometer reading.

B71-10070

TORCH KIT FOR WELDING IN DIFFICULT AREAS

STEIN, J. A./N. AM. ROCKWELL CORP./

APR. 1971

MSC-15704

Miniature tungsten inert gas welding torch, used with variously formed interchangeable soft copper tubing extensions, provides inexpensive, accurate welding capability for inaccessible joints. Kit effectively welds stainless steel tubing 0.089 cm thick. Other applications are cited.

B71-10073

PROCESS FOR PRODUCING MOLYBDENUM FOIL AND COLLAPSIBLE TUBING

BRETTIS, G. R./GE/ GAVERT, R. B. GROSCHKE, G. F.

APR. 1971 SEE ALSO NASA-CR-78308

GSFC-10008

Manufacturing process produces molybdenum foil 0.002 cm thick and 305 m long, and forms foil into high-strength, thin-walled tubing which can be flattened for storage on a spool. Desirable metal properties include high thermal conductivity stiffness, yield and tensile stress, and low thermal expansion coefficient.

B71-10076

REFRIGERATED CUTTING TOOLS IMPROVE MACHINING OF SUPERALLOYS

DUDLEY, G. M.

APR. 1971

LANGLEY-10488

Freon-12 applied to tool cutting edge evaporates quickly, leaves no residue, and permits higher cutting rate than with conventional coolants. This technique increases cutting rate on Rene-41 threefold and improves finish of machined surface.

B71-10116

B71-10116

**METAL-TO-CERAMIC SEALS - A LITERATURE SURVEY**

PHILLIPS, W. M.

MAY 1971 SEE ALSO AFML-TR-65-143, JPL-TR-34-1420

BPO-11430

Survey of unclassified literature furthers design and development of nuclear thermionic converter seals. Data cover topics which are particularly relevant to thermionics. Data are reviewed and review discussion is presented along with summary of earlier work.

B71-10117

**CERAMIC BACKUP RING PREVENTS UNDESIRABLE WELD-METAL BUILDUP**

LEONARD, G. E./AEROJET-GEN. CORP./

MAY 1971

NUC-10357

Removable ceramic backup material butted against weld zone back prevents weld metal buildup at that site. Method is successful with manual tungsten-inert gas /TIG/ welding of 316 corrosion resistant steel /CRES/ pieces with 0.76 cm throat diameter and 1.57 cm pipe internal diameter.

B71-10123

**INDUCTION BRAZING MANUAL**

INNOVATOR NOT GIVEN MAY 1971 SEE ALSO

NASA-PB-183-419

M-PS-14924

Manual presents standards and techniques which are known or are particular to specific industry, and is useful as guide in closing tolerance brazing. Material and equipment specifications, tool setting tables, and quality control data and instructions are included. Since similar standards are available, manual is supplementary reference.

B71-10127

**PHOTOSENSITIVE PLASTIC USED TO PRODUCE THREE-DIMENSIONAL CASTING PATTERNS**

WILLMENT, D. A.

MAY 1971

LANGLEY-10742

Patterns with small lettering and intricate designs are prepared by using two-dimensional artwork, photographic reduction and Dycril. Two-dimensional artwork and photographic processes replace conventional relief work. Artwork size is convenient and does not restrict lettering and design size in casting.

B71-10135

**ULTRA THIN GAGE PLASTIC FILM**

COX, D. W., JR./SEA-SPACE SYSTEMS, INC./

STRUBLE, A. D.

MAY 1971

LEWIS-11276

Process utilizing specially modified conventional equipment, with changes in process temperature, pressure, and cooling requirements produces ultra thin 1.56 micron /0.0614 mil/ thick polyethylene film.

B71-10168

**PARALLEL-GAP WELDING FOR JOINTS BETWEEN COPPER CONDUCTORS AND KOVAR**

MC DANIEL, G. E.

JUN. 1971 SEE ALSO NASA-TN-D-6236

M-PS-21224

Welding technique produces more reliable joints than soldering. Investigation used different sizes of copper conductors and component lead ribbons, corrosion protection platings, and melting points of metals being joined. Optimum combination is gold-plated component lead ribbons and solder-plated copper conductors.

B71-10199

**ALLOY VAPOR DEPOSITION USING ION PLATING AND FLASH EVAPORATION**

SPALVINS, T.

JUN. 1971 SEE ALSO B67-10006, NASA-TN-X-52823

LEWIS-11262

Method extends scope of ion plating technique to include deposition of alloy films without changing composition of plating alloy. Coatings flow with specimen material without chipping or

peeling. Technique is most effective vacuum deposition method for depositing alloys for strong and lasting adherence.

B71-10206

**INTERPRETATION OF ALUMINUM-ALLOY WELD RADIOGRAPHY**

DUREN, P. C. EISCH, E. B.,

JUL. 1971 SEE ALSO NASA-TN-X-53939

M-PS-20943

Report proposes radiographic terminology standardization which allows scientific interpretation of radiographic films to replace dependence on individual judgement and experience. Report includes over 50 photographic pages where radiographs of aluminum welds with defects are compared with prepared weld sections photomicrographs.

B71-10212

**FABRICATION OF LARGE TUNGSTEN STRUCTURES BY CHEMICAL VAPOR DEPOSITION**

KAHLE, V. E./AEROJET-GEN. CORP./

LEWIS, W. J. STUBBS, V. R.

JUL. 1971 SEE ALSO B67-10232, NASA-CR-72742

LEWIS-11239

Process is accomplished by reducing tungsten hexafluoride with hydrogen. Metallic tungsten of essentially 100 percent purity and density is produced and built up as dense deposit on heated mandrel assembly. Process variations are building up, sealing or bonding refractory metals at temperatures below transition temperatures of base metal substrates.

B71-10247

**TECHNIQUE FOR THE INTEGRAL CASTING OF PRESSURE INSTRUMENTATION IN WIND-TUNNEL MODELS**

JACKSON, C. M., JR. SUMMERFIELD, D. G.

JUL. 1971

LANGLEY-10812

Wind tunnel models are cast around core consisting of array of tubing. Principal advantage of technique is that greater number of pressure orifices are easily installed, without compromising aerodynamic shape of model. Technique reduces construction cost by about 50 percent.

B71-10253

**LOW-TEMPERATURE BONDING OF TEMPERATURE-RESISTANT ELECTRONIC CONNECTIONS**

PELUSO, R. F./MARTIN MARIETTA CORP./

JUL. 1971

M-PS-20909

Bonding of flat metal surfaces utilizes low temperature melting intermediate material, pulse heating, and pressure application to produce strong, electrically conductive bond resistant to melting at temperatures well above melting point of intermediate material. Little or no intermediate material remains at the interface.

B71-10256

**PLATING BY GLASS-BEAD PEENING**

BABECKI, A. J. HAEHNER, C. L.

JUL. 1971

GSFC-11163

Technique permits plating of primarily metallic substrates with either metals or nonmetals at normal temperature. Peening uses compressed air to apply concurrent streams of small glass beads and powdered plating material to the substrate.

B71-10257

**TECHNIQUE FOR IN-PLACE WELDING OF ALUMINUM BACKED UP BY A COMBUSTIBLE MATERIAL**

SPAGNUOLO, A. C.

JUL. 1971

LEWIS-11328

Welding external aluminum jacket, tightly wrapped around inner layer of wood composition fiberboard, in oxygen free environment prevents combustion and subsequent damage to underlying fiberboard. Technique also applies to metal cutting in similar assemblies without disassembly to remove combustible materials from welding heat proximity.

**B71-10268****DIFFERENTIAL EXPANSION FITTING FOR CRYOGENIC LIQUID TANKS**

LANDES, R. E./AEROJET-GEN. CORP./ MORRIS, E. E.  
AUG. 1971 SEE ALSO NASA-CR-72599

LEWIS-11260

Sliding contact between liner and interior surface of fitting accommodates stresses and strains developed in shell composite and metal liner system. Stresses and strains are transmitted to liner portion which is recessed in fitting and which acts as differential expansion fitting.

**B71-10280****WELD BEVELING OF LARGE-DIAMETER PIPES**

LIEBENSTEIN, R./BENDIX CORP./

AUG. 1971 SEE ALSO B68-10551, B69-10229, B69-10231  
KSC-10550

Technique employs electric drill and newly developed special jig to J-bevel, in the field, ends of pipes measuring between 15.24 cm and 45.72 cm in diameter in preparation for welding. Jig's construction and operation are described.

**B71-10293****IMPROVED BRAZING TECHNIQUE FOR PYROLYTIC GRAPHITE**

BOGOWITZ, R. G./INTERN. HARVESTER CO./ METCALFE, A. G.  
AUG. 1971

NPO-12026

Technique uses braze metal and joint design that together compensate for the difficult anisotropic properties of the graphite and are usable at elevated temperatures.

**B71-10336****STRONG, EASY-TO-HOLD, SPIRAL BUTTRESS THREAD**

HEIER, W. C.

SEP. 1971

LANGLEY-10755

Buttress thread with steep taper connects two molded plastic cylinders without changing wall thickness or sacrificing longitudinal strength at the juncture. Technique lends itself to conventional molding methods.

**B71-10338****ELECTROPLATING ON TITANIUM ALLOY**

LOWERY, J. R.

SEP. 1971

M-FS-21251

Activation process forms adherent electrodeposits of copper, nickel, and chromium on titanium alloy. Good adhesion of electroplated deposits is obtained by using acetic-hydrofluoric acid anodic activation process.

**B71-10354****MODULAR CONSTRUCTION PROVIDES LARGE VOLUME STORAGE FACILITY IN MINIMUM SPACE**

FAHNER, T./MCDONNELL DOUGLAS CORP./ HARWOOD, O. P.

SEP. 1971

M-FS-13568

Each modular element consists of two hemispherical shells with material removed near their apices to permit joining by a weldment to form a passage. Elements are welded together at their largest dimensions to form either a straight line continuous or a circular pressure vessel.

**B71-10363****CAST SEGMENT EVALUATION**

DIEM, R. G./ROCKETDYNE/ STUDHALTER, W. R.

SEP. 1971

M-FS-21354

Evaluation program to determine feasibility of fabricating segmented rocket engine thrust chambers using low cost, lightweight castings extends state of the art in areas of casting size and complexity, and in ability to provide thin sections and narrow, deep, cooling channels. Related developments are discussed.

**B71-10369****FABRICATION TECHNIQUES FOR THORIA-DISPERSED /TD/ NICKEL**

INNOVATOR NOT GIVEN /BELL AEROSPACE CO., C. S. IND./  
SEP. 1971 SEE ALSO NASA-CR-72742

LEWIS-11240

Metal spinning forms combustion chamber sections

and nozzle sections, arc welding joints sections to form rocket motor. Hastelloy-X as filler results in slightly weaker weld than the TD nickel weld, but permits formation of larger rocket motor than is otherwise possible.

**B71-10375****USE OF CERMET THIN FILM RESISTORS WITH NITRIDE PASSIVATED METAL INSULATOR FIELD EFFECT TRANSISTOR**

BROWN, G. A./TEX. INSTR., INC./ HARRAP, V.

OCT. 1971 SEE ALSO NASA-CR-97459

GSFC-10835

Film deposition of cermet resistors on same chip with metal nitride oxide silicon field effect transistors permits protection of contamination sensitive active devices from contaminants produced in cermet deposition and definition processes. Additional advantages include lower cost, greater reliability, and space savings.

**B71-10381****PROTECTIVE COATING FOR SALT-BATH BRAZING**

FRANCISCO, A. C. GYORGAK, C. A.

OCT. 1971

LEWIS-90255

Ceramic coating, consisting of graphite, enamelers' clay, and algin binder, applied to materials prior to salt bath brazing facilitates brazing process and results in superior joints. Alternate coating materials and their various proportions are given.

**B71-10415****FOLDING TOOLS FOR FLAT CONDUCTOR CABLE HARNESSSES**

LOGGINS, R.

NOV. 1971

M-FS-20121

Vise grip pliers have detachable metal gripping plates which are changed to accommodate cables from 1 to 3 in. wide and to form any desired fold angle. A second tool squeezes cable along crease to complete the fold.

**B71-10416****SPOOL FOR RELEASING AND RETRACTING FLAT CONDUCTOR CABLE**

ANGELE, W. CAMPBELL, E. C.

NOV. 1971

M-FS-20234

Spool design and operation permit installation of up to 8 cables on single unit. Heat treating the cables while wound in a coil obtains effective recoil action.

**B71-10417****SEATING TOOL FOR PREPARING MOLDED-PLUG TERMINATIONS ON FCC**

CHAMBERS, C. M. CORUM, C. C.

NOV. 1971 SEE ALSO B71-10422

M-FS-20123

Hand-operated tool positions and seats window piece and conductor spacer onto conductors of two stripped cables during process of terminating cables with molded plug. Tool accommodates cables up to 3 in. wide and is used in conjunction with folding tools.

**B71-10418****DURABILITY TESTER FOR FCC CONNECTORS**

CHAMBERS, C. M. MARTINECK, H. G.

NOV. 1971

M-FS-20128

Testing device monitors continuity and resistance of each circuit, it includes springloaded stationary fixture which holds plug, and moving fixture which is driven by small electric motor and is geared to mate and unmate connector 10 times per minute.

**B71-10419****PRECISION DIE-PUNCH FOR TRIMMING THE CONDUCTORS OF FLAT CONDUCTOR CABLE**

WEEKS, G. E., JR.

NOV. 1971

M-FS-20142

Operation trims conductor to width of 0.004 in. and consistently leaves 0.035 in. spaces between adjacent conductors, adapting cable for termination with standard plug.

B71-10420

**B71-10420  
FIXTURE FOR MULTIPLE-FCC CHEMICAL STRIPPING AND  
PLATING**

ANGELE, W. NORTON, W. E.  
NOV. 1971  
M-FS-20237

For chemical stripping, lead tape applied near ends to be stripped protects insulation. Taped ends are submerged half way in stripping solution. For electroplating, both ends of FCC are stripped - top ends for electric contact, others for submersion in electroplating solution.

**B71-10421  
SPRUE CUTOFF TOOL FOR MOLDED FCC PLUGS**

ANGELE, W. CHAMBERS, C. M.  
NOV. 1971  
M-FS-20236

Sprue removal operation is accomplished by positioning plug on tool bed, adjusting blades, and moving handle down for cutting process. Blades are raised to remove trimmed plug.

**B71-10422  
FOLDING TOOL FOR PREPARING FCC MOLDED-PLUG  
TERMINATIONS**

CAMPBELL, E. C. CHAMBERS, C. M.  
NOV. 1971  
M-FS-20116

Assemblies consist of window piece, conductor spacer, insulator, outer seal, and molded portion that integrates all components. Preparation of FCC for molded plug termination requires that terminated ends of conductors in each cable be accurately folded simultaneously into spacer end and groove.

**B71-10433  
HIGH TEMPERATURE AUTOCLAVE VACUUM SEALS**

HOFFMAN, J. R. SIMPSON, W. G. WALKER, H. M.  
NOV. 1971  
M-FS-21131

Aluminum sheet forms effective sealing film at temperatures up to 728 K. Soft aluminum wire rings provide positive seal between foil and platen. For applications at temperatures above aluminum's service temperature, stainless steel is used as film material and copper wire as sealant.

**B71-10435  
CARTESIAN-COORDINATE DIMENSIONING FOR PLUMBING SYSTEMS**

BUIRGY, P. A./H. AM. ROCKWELL CORP./  
NOV. 1971  
M-FS-18867

Nonprogressive dimensioning method specifies Cartesian coordinates for each critical point in detail drawings of precision plumbing and ducting components to avoid tolerance accumulation. Method permits direct fabrication of tubing shapes without necessitating generation of a preproduction tubing mockup.

**B71-10455  
PRACTICAL METHOD OF DIFFUSION-WELDING STEEL PLATE IN  
AIR**

HOLKO, K. H. MOORE, T. J.  
DEC. 1971 SEE ALSO NASA-TN-D-6409  
LEWIS-11387

Method is ideal for critical service requirements where parent metal properties are equaled in notch toughness, stress rupture and other characteristics. Welding technique variations may be used on a variety of materials, such as carbon steels, alloy steels, stainless steels, ceramics, and reactive and refractory materials.

**B71-10457  
MULTIEDGE SLITTER FOR FCC**

TUCKER, D. T. WEEKS, G. E., JR.  
NOV. 1971  
M-FS-20112

Tool cuts multiple slits up to 3 in. long between conductors of flat conductor cables up to 3 in. wide to prepare them for termination on terminal boards or in multipin connectors.

**B71-10458  
APPARATUS TESTS FLEXURAL DURABILITY OF FCC**

CHAMBERS, C. M. NORTON, W. E.

NOV. 1971  
M-FS-20113

Device tests electric continuity of flat cable conductors, FCC, in temperature controlled environment. Test method is described.

**B71-10459  
CABLE INSULATION CUT-THROUGH TESTER**

CAMPBELL, E. C. NORTON, W. E.  
NOV. 1971  
M-FS-20114

Device accurately measures cut-through load within specified time or time when cut-through occurs at specific load. Tests are performed at ambient conditions or in an environmental chamber.

**B71-10460  
COLD-BLADE STRIPPER FOR POLYIMIDE AND TFE INSULATION  
ON FCC**

ANGELE, W. CHAMBERS, C. M.  
NOV. 1971  
M-FS-20115

Stripper removes insulation to any desired depth by adjusting the distance between the blade and the plates on either side of the flat conductor cable, FCC.

**B71-10461  
HOT-BLADE STRIPPER FOR POLYESTER INSULATION ON FCC**

ANGELE, W. CHAMBERS, C. M.  
NOV. 1971  
M-FS-20117

Stripper incorporates a blade which is electrically heated to a controlled temperature. Heated blade softens and strips insulation from cable while paper ribbon removes insulation material and keeps blade clean for next operation.

**B71-10464  
HANDLING FIXTURE FOR SOLDERING ROUND WIRES TO FCC**

LOGGINS, R. MARTINECK, H. G.  
NOV. 1971  
M-FS-20118

Fixture holds flat conductor cable and wires in position until after soldering of contacting conductor ends and potting of junctions. Device provides for proper spacing of wires and adequate access for soldered joints during fabrication, and positions mold halves during potting operation.

**B71-10465  
ROTARY STRIPPER FOR SHIELDED AND UNSHIELDED FCC**

ANGELE, W. CHAMBERS, C. M.  
NOV. 1971  
M-FS-20119

Rotary stripper removes narrow strips of insulation and shielding to any desired depth. Unshielded cables are stripped on both sides with one stroke, shielded cables are stripped in steps of different depths.

**B71-10467  
EXOTHERMIC BRAZING UNITS**

MC CAIG, J. C./WHITTAKER CORP./  
NOV. 1971  
M-FS-21435

Units are used for repairing and assembling stainless steel tubing. Heat generated by chemical reaction is used to melt brazing alloy and bonded area is not contaminated by the reactants or by-products of the reaction.

**B71-10505  
MEASURING INTERNAL DIMENSIONS OF SMALL TRANSPARENT  
OBJECTS**

MILLS, S. M. SALMIRS, S.  
DEC. 1971  
LANGLEY-10712

Technique individually photographs first the orifice in the transparent object and then a microscopic scale immersed in a liquid having the same index of refraction as the transparent object. Using a scale photograph, the orifice photograph is measured.

**B71-10520  
SOLID STATE WELDING OF DISPERSION-STRENGTHENED NICKEL**

## ALLOYS

HOLKO, K. H. MOORE, T. J.  
DEC. 1971 SEE ALSO NASA-TN-D-6493  
LEWIS-11388

Two-step solid state welding cycle applied to carefully prepared surfaces of an unrecrystallized alloy prevents loss of parent-metal strength at weld joint of dispersion-strengthened, nickel-chromium alloy.

B71-10523

FOLDABLE PATTERNS FORM CONSTRUCTION BLOCKS  
HUBER, W. C. RITTER, D. L./INTERN. PAPER CO./  
DEC. 1971  
NSC-13860

Building blocks with interlocking tabs can be constructed from flat sheets of material using minimum of tools and equipment. Blocks can be used for storing and shipping supplies to remote areas, then filled with soil and stacked to form inhabitable structures which can be dismantled and reused.

B71-10525

COPPER/NICKEL EUTECTIC BRAZING OF TITANIUM  
KUTCHERA, R. E./GE/  
DEC. 1971  
ARC-10337

Technique joins titanium or one of its alloys to materials, such as iron, nickel or cobalt base material, or to refractory metals. To ensure formation of a satisfactory bond, the temperature, time, environment and pressure must be controlled.

B71-10531

JOINT PRELOAD PROPERTIES OF STRUCTURAL THREADED FASTENERS  
BRENNER, H. S./ALMAY RES. AND TESTING CORP./  
DEC. 1971 SEE ALSO NASA-CR-103179  
M-FS-21453

Proper installation techniques are described and reliable torque-tension values are presented on joint preload /or clamp load/ properties of structural threaded fasteners.

## 09 COMPUTER PROGRAMS

B71-10002

FAST MARS COMMUNICATION GEOMETRY PROGRAM  
GARNER, W. R./MARTIN MARIETTA CORP./ TULLY, J. Q.  
JAN. 1971  
LANGLEY-10658

Computer program calculates trajectories of orbiting spacecraft and lander vehicles simultaneously. Using data from both vehicles, program calculates communications geometry which consists of orbiting spacecraft cone/clock angle, lander cone/clock angle, range, range rate and acceleration, and fade, reflective, and system margins.

B71-10003

DIGITAL SIMULATION ERROR CURVES FOR A SPRING-MASS-DAMPER SYSTEM  
KNOX, L. A./IBM/  
FEB. 1971  
M-FS-20770

Plotting digital simulation errors for a spring-mass-damper system and using these error curves to select type of integration, feedback update method, and number of samples per cycle at resonance reduces excessive number of samples per cycle and unnecessary iterations.

B71-10006

SYSTEMS OF CODING AND THEIR IMPLEMENTATION  
ANDERSON, T. O.  
JAN. 1971  
NPO-11469

Engineering planning document surveys mechanics, utility, and potential improvements of codes which control noise-generated errors introduced into radio transmission of binary information. Chronological development of certain codes and a

comprehensive bibliography are included.

B71-10007

NON-SYMMETRICAL TWO DIMENSIONAL SCATTERING PROGRAM  
HATFIELD, J. BUSCH, W. V. T.  
JAN. 1971  
NPO-11576

Computer program, 2DSCAT, solves integral equation for currents induced by electric or magnetic plane wave incident upon one or more conducting cylinders. Subroutine, FIELD, assumes that an incident wave is perpendicular to the cylindrical surface. Restrictions on this program are given.

B71-10008

SYMMETRICAL TWO DIMENSIONAL SCATTERING PROGRAM  
HATFIELD, J. BUSCH, W. V. T.  
JAN. 1971  
NPO-11578

Computer program solves integral equation for currents induced by electric or magnetic plane wave incident upon one or more conducting cylinders with a midplane of symmetry. Program utilizes symmetry of the geometry. Restrictions on the program are given.

B71-10017

TRACKING ANTENNA DEFORMATION PROGRAM  
GALEF, A. E./TRW SYSTEMS GROUP/  
JAN. 1971  
GSFC-11191

Computer program provides capability for analyzing accelerometer data obtained from impulsive testing of large antennas, and of determining from that data pertinent characteristics /amplitude, frequency, damping/ of the structural modes excited by the impulse.

B71-10030

LIFT DISTRIBUTION IN A RECTANGULAR JET  
JAMESON, A./GRUMMAN AEROSPACE CORP./  
FEB. 1971  
ARC-10424

Computer programs predict effect of slipstream-wing flow interaction on aerodynamic characteristics of deflected slipstream and tilt aircraft. One program calculates lift distribution, lift, and drag of wing in wide slipstream. Results permit development of simplified lifting surface theory for circular jet.

B71-10037

COMPUTER PROGRAM FOR PREDICTING CREEP BEHAVIOR OF BODIES OF REVOLUTION  
ADAMS, R./TRW SYSTEMS/ GREENBAUM, G.  
FEB. 1971  
NUC-11104

Computer program, CRAB, uses finite-element method to calculate creep behavior and predict steady-state stresses in an arbitrary body of revolution subjected to a time-dependent axisymmetric load. Creep strains follow a time hardening law and a Prandtl-Reuss stress-strain relationship.

B71-10038

FEATS - FINITE ELEMENT THERMAL STRESS ANALYSIS OF PLANE OR AXISYMMETRIC SOLIDS  
SWANSON, J. A./WESTINGHOUSE ASTRONUCL. LAB./  
FEB. 1971  
NUC-10242

FEATS computer code uses finite element analysis to calculate steady state temperature and thermal stress fields for either axisymmetric or plane two-dimensional bodies with boundary conditions, including specified displacements, loads, and thermal boundary conditions.

B71-10039

AUTOTEM - AUTOMATED GEOMETRY MESHING AND HEAT CONDUCTION CALCULATION  
LEE, A. Y./WESTINGHOUSE ASTRONUCL. LAB./ WELLS, K. J.  
FEB. 1971  
NUC-10241

Temperature distribution for an arbitrary irregular body is calculated by AUTOTEM, which generates required input data automatically by computer. Temperature distribution is calculated for a two-dimensional plane section in /x,y/

B71-10052

coordinates or for an axisymmetric irregular body in  $r, z$ -coordinates.

B71-10052

FORTRAN PROGRAMMING - A SELF-TAUGHT COURSE  
BLECHER, S./COMPUTER SCI. CORP./ BUTLER, R. V. HORTON,  
M. NORRIS, V.

APR. 1971 SEE ALSO NASA-CR-1478

LANGLEY-10738

Comprehensive programming course begins with numerical systems and basic concepts, proceeds systematically through FORTRAN language elements, and concludes with discussion of programming techniques. Course is suitable either for individual study or for group study on informal basis.

B71-10054

PROGRAM FOR IMPROVED ELECTRICAL HARNESS DOCUMENTATION AND FABRICATION

INNOVATOR NOT GIVEN /GE/ APR. 1971

GSFC-10386

Computer program provides automated print-out of harness interconnection table and automated cross-check of reciprocal pin/connector assignments, and improves accuracy and reliability of final documented data. Programs and corresponding library tapes are successfully and continuously employed on Nimbus spacecraft programs.

B71-10086

DIGITAL-CODED MATRIX SYSTEM SIMPLIFIES DESIGN AND CONSTRUCTION OF FLOW CHARTS

OTOOLE, E./MARTIN MARIETTA CORP./

APR. 1971

MSC-13539

Matrix system utilizing unique digital code enables drawing block diagrams with parallel blocks. Complete freedom is obtained in laying out diagram, and it is possible to go directly from matrix to finished drawing. Need to rough out diagram is eliminated and time involved is greatly reduced.

B71-10106

RADIATION VIEW FACTOR PROGRAM

LOVIN, J. K./LOCKHEED MISSILES AND SPACE CO./  
LUBKOWITZ, A. W.

MAY 1971

M-FS-21075

Computer program, RAVFAC, calculates diffuse radiation view factors, using contour integrals. Technique is combined with finite difference /double summation/ technique to compose total program package.

B71-10108

FISCAL OUTPUT DATA PRODUCE VERSATILE GRAPHIC-NUMERIC CHARTS

POWELL, R. W./AERO JET-GEN. CORP./ ROHO, J. J.

MAY 1971

NUC-10394

Refined computerized plotting system produces low-cost graphic-numeric charts that illustrate fiscal data on monthly incremental or cumulative basis, or both. Output is in the form of hard copy or microfilm, or visual-aid transparencies prepared from hard copy for rapid management status presentations.

B71-10115

COMPUTER PROGRAM FOR THERMAL ANALYSIS OF SHADOW SHIELDS IN A VACUUM

BOYLE, R. J. KNOLL, R. H.

MAY 1971

LEWIS-11236

Computer program determines temperature profiles and heat transfer rates for shadow shielded cryogenic tank. Tank, shields, and thermal radiation heat source are all axisymmetric. Thermal analysis considers varying shield and tank temperatures, surface properties, and geometric arrangements. Similar heat source properties are also considered.

B71-10122

PUZZLE - A PROGRAM FOR COMPUTER-AIDED DESIGN OF PRINTED CIRCUIT ARTWORK

HARRELL, D. A. W. ZANE, R.

MAY 1971

LEL-10050

Program assists in solving spacing problems encountered in printed circuit /PC/ design. It is intended to have maximum use for two-sided PC boards carrying integrated circuits, and also aids design of discrete component circuits.

B71-10130

CSM PROGRAMS SM RCS PROPELLANT QUANTITY GAGING SYSTEMS PROGRAM

COX, G. R./N. AM. ROCKWELL CORP./ REYNOLDS, R. G.

MAY 1971

MSC-17308

Computer program calculates actual and useable remaining propellant quantities as required in positive expulsion rocket engine propellant feed system. Program establishes relationship between helium system pressures and temperatures and propellant weight remaining in tanks. Program is written in FORTRAN 4 for IBM-360 computer.

B71-10133

MULTI-DIMENSIONAL REAL FOURIER TRANSFORM

KROGH, F. T.

MAY 1971

NPO-11648

Four subroutines compute one-dimensional and multi-dimensional Fourier transforms for real data, multi-dimensional complex Fourier transforms, and multi-dimensional sine, cosine and sine-cosine transforms. Subroutines use Cooley-Tukey fast Fourier transform. In all but one-dimensional case, transforms are calculated in up to six dimensions.

B71-10134

HIGH-IMPACT DYNAMIC-RESPONSE ANALYSIS OF NONLINEAR STRUCTURES

GUPTA, K. K.

MAY 1971

NPO-11716

Program predicts expected deformations and stresses in nonlinear simple geometric structures subjected to high-impact loading. Technique is based on node-wise predictor-corrector approach and requires moderate computer storage and run time for most problems. Program extends to include physical and geometrical nonlinearities.

B71-10138

SUBROUTINES FOR EVALUATING SINGLE AND MULTIPLE INTEGRALS USING MODIFIED ROMBERG METHOD

BUNTON, W. R. DIETHELM, M.

MAY 1971

NPO-11718

Routines, which have been thoroughly tested, are found to be equal to or better than comparable routines. They are more reliable than SQUANK and capable of solving a larger class of problems.

B71-10147

QUICK RESPONSE TARGETING PROGRAM

BOSLEY, J. T./BOEING CO./

MAY 1971

M-FS-15157

Computer program generates and verifies operational launch vehicle targeting presettings for lunar free-return missions and lunar landing missions. Program is applicable in astronomy and nuclear physics, and in areas where improved targeting techniques are valuable.

B71-10151

METHOD FOR CONSTRUCTING PERIODIC ORBITS IN NONLINEAR DYNAMIC SYSTEMS

BENNETT, A. G./BOEING CO./ HANAFY, L. M. PALMORE, J. I.

MAY 1971

M-FS-14654

Method is modification of generalized Newton-Raphson algorithm for analyzing two-point boundary problems. It constructs sequence of solutions that converge to precise dynamic solution in the sequence limit. Program calculates periodic orbits in either circular or elliptical restricted three-body problems.

B71-10153

COMPUTER PROGRAM FOR CALCULATING AERODYNAMIC FORCES ON  
BLADE SECTIONS

MC NALLY, W. D.

JUN. 1971 SEE ALSO LEWIS-10743 LEWIS-10789,

LEWIS-11097

LEWIS-11382

Calculation is taken from pressure or velocity distribution along blade surface. Blade sections have either one or two /tandem/ blade segments. Program is recommended primarily for use with ideal flow pressure distributions where forces in drag direction are neglected.

B71-10155

COMPUTING INCOMPRESSIBLE LAMINAR AND TURBULENT  
BOUNDARY LAYER FORMATION

HERRING, H. J./PRINCETON UNIV./ MELLOR, G. L.

MAY 1971

LEWIS-11190

Program generates initial laminar conditions, such as in Falkner-Skan similarity flows, or turbulent equilibrium profiles. Initial profile input data is used. Combination with inviscid-freestream calculations to predict entire flow field in turbine cascade or around airfoil is possible.

B71-10181

## ACCUMULATIVE WEIGHTS PROGRAM

PATE, W. B./BOEING CO./ PINCHA, P. J.

JUN. 1971

M-FS-15066

Program provides capability of assessing weight above given structural station planes for inert and variable masses for any selected loading condition. Output is produced that yields weight data concentrated on and/or cantilevered from stations along Saturn 5 vehicle's verticle axis. Input data availability limits program's function to vertical structures.

B71-10185

ELAS8 - COMPUTER PROGRAM FOR LINEAR STRUCTURE  
EQUILIBRIUM PROBLEMS

UTKU, S.

JUN. 1971 SEE ALSO B68-10187

NPO-11555

Program generates and solves governing equations for unknown deflection of mesh points as if problem were to locate stationary point of total potential function associated with given loading and unknown deflections. Solution is obtained by means of displacement method and finite element technique.

B71-10186

NUMERICAL INTEGRATION OF SECOND ORDER DIFFERENTIAL  
EQUATIONS

SHANKS, E. B./VANDERBILT UNIV./

JUN. 1971

M-FS-20536

Performance characteristics of higher order approximations of Runge-Kutta type are analyzed, and performance predictors for time required on machine and for error size are developed. Technique is useful in evaluating system performance, analyzing material characteristics, and designing inertial guidance and nuclear instrumentation and materials.

B71-10211

## ROTOR DYNAMIC RESPONSE ANALYSIS PROGRAM

SHEN, P. A./ROCKETDYNE/

JUL. 1971

HQ-10579

Computer routine is similar to Holzer's method in torsional vibration treatment, and Prohl's and Myklestad's approach in computing rotor deflection. Matrix iteration technique is used to compute rotordynamic response by a simulated discrete mass system.

B71-10215

DIGITAL COMPUTER PROGRAM FOR ANALYZING CHUGGING  
INSTABILITIES

SZUCH, J. R.

JUL. 1971

LEWIS-11294

Program computes combustion delays, gas residence

time, characteristic velocity, and other steady-state parameters required for solution of the characteristic equation. Equation is solved for critical values of injector pressure drops and chugging frequency.

B71-10238

COMPUTER-AIDED DESIGN OF LARGE-SCALE INTEGRATED  
CIRCUITS - A CONCEPT

SCHANSMAN, T. T./M&amp;S COMPUTING, INC./

JUL. 1971

M-FS-20600

Circuit design and mask development sequence are improved by using general purpose computer with interactive graphics capability establishing efficient two way communications link between design engineer and system. Interactive graphics capability places design engineer in direct control of circuit development.

B71-10240

## STORED PROGRAM CONCEPT FOR ANALOG COMPUTERS

HANNAUER, G., III/ELECTRON. ASSOCIATES INC./ PATMORE, J. R.

JUL. 1971

M-FS-20874

Optimization of three-stage matrices, modularization, and black boxes design techniques provides for automatically interconnecting computing component inputs and outputs in general purpose analog computer. Design also produces relatively inexpensive and less complex automatic patching system.

B71-10243

## DSIF STATION SCHEDULES

FLARITY, L. D. HANSON, R. J. THOM, E. H.

JUL. 1971

NPO-11547

System manages Deep Space Instrumentation Facilities /DSIF/ equipment construction and modification planning. Versatile program applies to such tasks as employee time and task schedules, pay schedules, operations schedules, and plant and equipment procurement, construction, modification or service.

B71-10244

## MANPOWER FORECAST PROGRAM

MC CORNOCK, M. D. MINER, E. R.

JUL. 1971

NPO-11551

Program reports distribution of actual manpower levels in each section versus accounts, projects versus sections, sections versus manpower classes, and project offices versus sections.

B71-10248

VARIABLE ORDER INTEGRATORS FOR THE NUMERICAL SOLUTION  
OF ORDINARY DIFFERENTIAL EQUATIONS

KROGH, P. T.

JUL. 1971

NPO-11643

Series of computer subroutines integrates systems of ordinary differential equations and is used for numerical quadrature.

B71-10250

## BATTERY SIMULATION PROGRAM

ABREU, A. SLOMSKI, J. P.

JUL. 1971

NPO-11580

Computer program calculates spacecraft battery energy at specific times dictated by input sequence of recharge, discharge, and no activity phases. Recharge phases are assumed during times not specified, unless batteries are fully charged. Warnings are printed when energy falls below specified level. Program assumes two identical batteries.

B71-10267

## ANALYSIS OF LOW RESOLUTION MASS SPECTRA

BABST, R. W./SPERRY RAND CORP./ SHAPIRO, R.

AUG. 1971

GSFC-11279

Computer program determines gas constituents from measurements of mass/peak-height spectrum from residual gas analyzer. Applications of program

include residual gas analysis for work in space environmental simulators, space environment contamination, and air pollution monitoring.

B71-10284

## ON-LINE ANALYSIS OF RANDOM VIBRATIONS

COLE, H. A., JR.

AUG. 1971

ARC-10154

Measuring device, Randomec, provides continuous on-line signatures representative of system free vibration curve. Selected points on curve are used in control and failure detection systems. Apparatus applied to both linear and nonlinear systems under nonstationary vibratory states.

B71-10285

## NASTRAN COMPUTER SYSTEM LEVEL 12.1

BUTLER, T. G.

AUG. 1971 SEE ALSO NASA-SP-221, NASA-SP-222,

NASA-SP-223, NASA-SP-224, NASA-SP-260

GSPC-10991

Program uses finite element displacement method for solving linear response of large, three-dimensional structures subject to static, dynamic, thermal, and random loadings. Program adapts to computers of different manufacture, permits up-dating and extension, allows interchange of output and input information between users, and is extensively documented.

B71-10294

## RAY TRACING PROGRAM WITH OPTIONS FOR DIFFRACTION GRATINGS

HOWELL, B. J./SPERRY RAND CORP./

AUG. 1971

GSPC-11305

Diffraction theory, developed in vectorial form and coded into ray tracing routines, permits tracing rays of any wavelength through surfaces that are plane, spherical, conical, or aspheric polynomial. Ruled diffraction gratings may run in either X-direction or Y-direction, where Z is optical axis.

B71-10295

## DETERMINATION OF RADIATION INTERCHANGE FACTORS

BOBCO, R. P./HUGHES AIRCRAFT CO./ EGENDORF, P. L. MC

GRATH, R. J.

AUG. 1971

MSC-13475

Method utilizes an analytical model, a method of solution which is compatible with digital computer analysis, and a generalized computer program to carry out the computations.

B71-10296

## SPIN VECTOR CONTROL OF A SPINNING SPACE STATION

HENDRICKS, T./MARTIN MARIETTA CORP./

AUG. 1971

M-FS-21333

Digital computer program simulates system and related functions. Program is intended for, but not limited to, altitude control studies of rotating space station. Russel's method of formulating and solving motion equations for system of rigid bodies connected by movable joints is applied. Program features are listed.

B71-10306

## CLOSED-LOOP CONTROL OF STOCHASTIC NONLINEAR SYSTEMS

SCHMIDT, G. T./MIT/

AUG. 1971

MSC-13858

Technique resolves problems in complex control systems, such as those used for space vehicle guidance and control. Main disadvantage of procedure is that it is only appropriate in situations where trajectory concept is valid.

B71-10308

## ENERGY LEVELS AND TRANSITION PROBABILITY MATRIX

ELEMENTS OF RUBY FOR LASER APPLICATIONS

BERWIN, R. W.

AUG. 1971

NPO-11687

Program computes fine structure energy levels of ruby as a function of magnetic field. Included in program is matrix formulation, each row of

which contains a magnetic field and four corresponding energy levels.

B71-10314

## TCB OPERATION SUPPLY INVENTORY SYSTEM /TCBSYS/

TU, H.-Y./COMPUTING AND SOFTWARE, INC./

AUG. 1971

GSPC-11306

System produces inventory report for each updated period and special report for long term inventory information summary. Report summarizes consumption, outstanding orders, and balance of each inventory item. System generates, corrects, and adjusts inventory tapes. Restrictions of system are listed.

B71-10321

## MAPS - A COMPUTERIZED MANAGEMENT ANALYSIS AND PLANNING SYSTEM

PACKE, D. R. RAFFAELI, G. A.

AUG. 1971

LEWIS-11349

Program lists work structure of projects at all levels. System integrates work item, its schedule, its status against the schedule, responsible personnel, and explanatory comments. Structure of MAPS promotes natural organization of project work elements, project features and uses are given.

B71-10372

## ANALYSIS OF MULTILAYERED FIBER COMPOSITES

CHAMIS, C.

OCT. 1971

LEWIS-11347

Multilevel analysis computer program is useful in fiber matrix composites diagnosis, in structural syntheses of multilayered thornel/epoxy composite plates, in buckling studies of simply supported multilayered fiber composite plates, and in computing lamination residual stresses in angle ply composites.

B71-10373

## COMPUTATION OF GROUP TABLE ALPHANUMERIC DISPLAY

ALLEN, G. EVANS, D. D.

SEP. 1971

LEWIS-11346

Computer program, using only group elements as input data, provides machine computation of group tables used for proving theorems and algorithms of finite groups. Program is written for second generation computers.

B71-10374

## DYNAMICS OF SHORT PRESSURE PROBES

ENGLUND, D. R. NYLAND, T. W.

SEP. 1971

LEWIS-11293

Report presents practical information for incorporating particle impact protection features and average total pressure measurement into probe design while optimizing probe transient response. Computer program calculates probe response, based on Bergh-Tijdeman equation.

B71-10376

## NEW PROCEDURE FOR DETERMINING MINIMUM TIME ORBIT

TRANSFERS

DAVIS, D. A./BOEING CO./

OCT. 1971

M-FS-14804

Computer program includes time minimizing function required for propellant constrained minimum time impulsive transfer between coplanar circular orbits or unrestricted orbits. Basic formulation is extended to include inclined circular or inclined elliptic orbits.

B71-10377

## COMPUTER PROGRAM FOR DISCOUNTED CASH FLOW/RATE OF

RETURN EVALUATIONS

ROBSON, W. D./ROCKETDYNE/

OCT. 1971

M-FS-19040

Technique, incorporated into set of three computer programs, provides economic methodology for reducing all parameters to financially sound common denominator of present worth, and

calculates resultant rate of return on new equipment, processes, or systems investments.

B71-10382  
STUDY-SIMULATION OF SPACE STATION DYNAMICS  
GAITHERS, M. J./GE/  
OCT. 1971  
M-FS-21227

Matrix algebra translator and executor /MATE/ takes equations describing structural control system environmental interaction problem for flexible spacecraft components and loads them into self programming computer.

B71-10384  
METABOLIC BALANCE ANALYSIS PROGRAM  
ROMBACH, J./MARTIN MARIETTA CORP./  
OCT. 1971  
M-FS-21237

Computer program calculates 28 day diet for life support consumables requirements and waste removal. Equations representing food breakdown into carbohydrates, fats, and proteins, modified to account for digestive materials and indigestible crude fibers, formulate total energy consumption. Program applications are listed.

B71-10386  
THERMAL ANALYSIS SYSTEM /TAS-1/ PROGRAM  
HULTBERG, J. A. OBRIEN, P. F.  
OCT. 1971  
NPO-11849

Digital computer program develops temperature control system which maintains various subsystems within proper temperature limits. Coding is simple and input rules are easy to use and remember. Output format is easy to understand and to analyze for error diagnosis.

B71-10389  
TOLERANCE ANALYSIS PROGRAM  
WATSON, H. K./N. AM. ROCKWELL CORP./  
OCT. 1971  
MSC-17487

Digital computer program determines tolerance values of end to end signal chain or flow path, given preselected probability value. Technique is useful in the synthesis and analysis phases of subsystem design processes.

B71-10390  
DOUBLE PRECISION TRAJECTORY PROGRAM /DPTRAJ 2.2C/  
JOSEPH, A. E. KHATIB, A. R. STRAND, J. STURMS, P. M., JR. TALBOT, T. D. WARNER, M. R. WITT, J.  
OCT. 1971  
NPO-11798

Four part program computes trajectory of space probe moving in solar system and subject to variety of forces.

B71-10392  
COMPUTER PROGRAM /TURBLE/ FOR CALCULATING VELOCITIES AND STREAMLINES IN TURBOMACHINES  
KATSANIS, T. MC NALLY, W. D.  
OCT. 1971 SEE ALSO B68-10097  
LEWIS-10788

Program is used in design of turbomachinery blade rows, where fluid velocities in blade to blade passage must be obtained. TURBLE requires input data on blade geometry, meridional stream-channel geometry, total flow conditions, weight flow, and inlet and outlet flow angles.

B71-10398  
STEADY TEMPERATURE AND DENSITY DISTRIBUTIONS IN A GAS CONTAINING HEAT SOURCES  
DAVISON, H. W.  
OCT. 1971  
LEWIS-10905

Computer program, STADDIG, is based on steady state, one dimensional heat transfer calculation using cylindrical coordinates. Program allows for conduction across gas and container walls. Heat is dissipated from walls by forced convection cooling with incompressible coolant. Heat sources are included in coolant, gas, and walls.

B71-10399  
ANALYSIS AND DESIGN OF A FLAT CENTRAL FINNED-TUBE RADIATOR  
AUER, B. M. HALLER, H. C. KREBS, R. P.  
OCT. 1971  
LEWIS-10893

Computer program based on fixed conductance parameter yields minimum weight design. Second program employs variable conductance parameter and variable ratio of fin length to tube outside radius, and is used for radiator designs with geometric limitations. Major outputs of the two programs are given.

B71-10400  
COMPUTER PROGRAM OPTIMIZES DESIGN OF NUCLEAR RADIATION SHIELDS  
LAHTI, G. P.  
OCT. 1971  
LEWIS-10998

Computer program, OPEX 2, determines minimum weight, volume, or cost for shields. Program incorporates improved coding, simplified data input, spherical geometry, and an expanded output. Method is capable of altering dose-thickness relationship when a shield layer has been removed.

B71-10401  
MICROBIAL BURDEN PREDICTION MODEL PROGRAM  
MEUSER, R. P./MARTIN MARIETTA CORP./ NELSON, B. A.  
OCT. 1971  
NPO-11709

Model supplements biological surveys of spacecraft by simulating microbial burden accumulation process during periods when surveys are not taken. Important application of model is to predict microbial loading on spacecraft landing capsule immediately prior to terminal heat sterilization.

B71-10402  
COMPUTER PROGRAM CALCULATES TRANSONIC VELOCITIES IN TURBOMACHINES  
KATSANIS, T.  
OCT. 1971  
LEWIS-10977

Computer program, TSONIC, combines velocity gradient and finite difference methods to obtain numerical solution for ideal, transonic, compressible flow for axial, radial, or mixed flow cascade of turbomachinery blades.

B71-10413  
FRACTURE MECHANICS EVALUATION OF TI-6AL-4V PRESSURE VESSELS  
COX, D. G./BOEING CO./  
NOV. 1971  
MSC-13995

Computer program calculates maximum potential flaw depth after specific cyclic pressure history. Kobayashi's solution to critical stress intensity equation and empirical relation for flaw growth rate are used. Program assesses pressure vessels of any material but only cylindrical or spherical shapes.

B71-10414  
FRAME MODAL ANALYSIS  
GUYAN, R. J./N. AM. ROCKWELL CORP./ HECKENLAIBLE, R. N.  
NOV. 1971  
MSC-17562

Computer model calculates natural frequencies and modal displacements of three-dimensional frame structures, and generates stiffness and mass matrices. Structures may be divided into several substructures prior to calculation of modal characteristics.

B71-10423  
ERROR EVALUATION FOR DIFFERENCE APPROXIMATIONS TO ORDINARY DIFFERENTIAL EQUATIONS  
HAMMOND, J. L., JR./GA. INST. OF TECH./  
NOV. 1971 SEE ALSO B71-10424 NASA-CR-103015  
M-FS-21610

Method involves relationships between errors introduced by using finite sampling rates and parameters describing specific numerical method

B71-10424

used. Procedure is used in design and analysis of digital filters and simulators.

B71-10424

**HYBRID COMPUTER TECHNIQUES FOR SOLVING PARTIAL DIFFERENTIAL EQUATIONS**

HAMMOND, J. L., JR./GA. INST. OF TECH./ ODOWD, W. M.  
NOV. 1971 SEE ALSO B71-10423

M-PS-21386

Techniques overcome equipment limitations that restrict other computer techniques in solving trivial cases. The use of curve fitting by quadratic interpolation greatly reduces required digital storage space.

B71-10431

**MANPOWER MANAGEMENT INFORMATION SYSTEM /MIS/ GRAVETTE, M. C./COMPUTER SCI. CORP./ KING, W. L.**

NOV. 1971

M-PS-21477

System of programs capable of building and maintaining data bank provides all levels of management with regular manpower evaluation reports and data source for special management exercises on manpower.

B71-10441

**VIBRATIONAL TRANSFER FUNCTIONS FOR BASE EXCITED SYSTEMS**

ERNST, C./MARTIN MARIETTA CORP./ JONES, P. J.

NOV. 1971

M-PS-21432

Computer program GD203 develops transfer functions to compute governing vibration environment for complex structures subjected to a base motion.

B71-10447

**MINIMUM WRIGHT METEOROID SHIELDING DETERMINATION FURUIKE, S. C./N. AM. ROCKWELL CORP./ MC HUGH, A. H.**

RICHARDSON, A. J.

NOV. 1971

MSC-17017

Computer program determines minimum shielding necessary for adequate protection of flight hardware, based on component physical size, methods of shielding to be used, and amount of damage which can be sustained without component failure.

B71-10448

**FORTRAN 4 DIGITAL PROGRAM CHANGER**

MADDEN, M. F./N. AM. ROCKWELL CORP./

NOV. 1971

MSC-17567

Computer program modifies other source language programs as aid to debugging, checkout and final documentation to eliminate manual performance of rearranging and incrementing statement numbers, identifying and sequencing cards and inserting and/or removing end-of-batch symbols.

B71-10453

**GRAPHICAL METHOD FOR ANALYZING DIGITAL COMPUTER EFFICIENCY**

CHAN, S. P./SANTA CLARA UNIV./ MUNOZ, R. M.

NOV. 1971

ARC-10210

Analysis method utilizes graph-theoretic approach for evaluating computation cost and makes logical distinction between linear graph of a computation and linear graph of a program. It applies equally well to other processes which depend on quantitative edge nomenclature and precedence relationships between edges.

B71-10456

**OPTICAL DESIGN AND ANALYSIS PROGRAM**

HEREDITH, C. F./SPERRY RAND CORP./

NOV. 1971

GSFC-11393

Computer program provides efficient handling of optical analysis equations and is sufficiently general in approach to accept wide variety of systems. Diagnostic messages are generated to aid user in pinpointing any inconsistencies in system definition.

B71-10462

**RADIATION DIFFRACTION CALCULATION PROGRAM /DIFF2/**

INNOVATOR NOT GIVEN /PROGRAMMING METHODS, INC./ NOV. 1971

GSFC-11422

Computer program computes maximum possible strength of interference pattern sent from high altitude tracking and data relay satellite to low altitude user satellite.

B71-10463

**CLOUD-FREE RESOLUTION ELEMENT STATISTICS PROGRAM**

LILEY, B./N. AM. ROCKWELL CORP./ MARTIN, C. D.

NOV. 1971

GSFC-11494

Computer program computes number of cloud-free elements in field-of-view and percentage of total field-of-view occupied by clouds. Human error is eliminated by using visual estimation to compute cloud statistics from aerial photographs.

B71-10472

**LANDING DYNAMICS PROGRAM FOR IMPACT ATTENUATING**

**VEHICLES /LANDIT/**

KNOELL, A. C. PATTON, R. H.

DEC. 1971

NPO-10840

Computer program accurately predicts impact response of previously designed disc-type Mars prototype landing vehicle. Program may be used in any design area where energy dissipation is considered.

B71-10473

**COMPUTER DESIGN OF EXTENSION SPRINGS**

MOORE, D. R./N. AM. ROCKWELL CORP./

DEC. 1971

M-PS-24073

Computer program speeds up design process of tension springs and simultaneously optimizes the design by varying the input.

B71-10490

**MONTE CARLO PROGRAM FOR THE TRANSPORT OF NEUTRONS AND**

**GAMMA RAYS**

JORDON, T. M./A.R.T. RES. CORP./

DEC. 1971

LEWIS-11403

Computer program computes transport of neutrons and gamma rays in complex geometries and fluxes averaged over specified regions and surfaces of the geometry.

B71-10491

**SYNTHESIS OF DYNAMIC SYSTEMS**

ADMIRE, J./MARTIN MARIETTA CORP./ WOHLER, R.

DEC. 1971

M-PS-21490

FORTRAN matrix analysis /FORMA/ program finds solutions of small and medium size structural dynamics problems of up to 150 deg of freedom.

B71-10492

**OPTIMIZED TECHNIQUES AND REQUIREMENTS FOR COMPUTER**

**IMPROVEMENT OF STRUCTURAL WELD RADIOGRAPHS**

THOMAS, D. T.

DEC. 1971

M-PS-21627

Hardware and software specification covers requirements for using subroutines to improve structural weld photographs.

B71-10499

**A LOW-ALTITUDE SATELLITE INTERACTION STUDY**

BIENKOWSKI, G. K./RCA/ HOLMAN, J. M. L. MC KINLEY, R.

R. SISKIND, S. M.

DEC. 1971

GSFC-11384

Two computer programs calculate interaction effects of high speed spacecraft on the environment at altitudes from 90 km to 150 km. EXT program determines fluid field in bodies of arbitrary geometries in transient flow regime. INT program uses EXT output and measures flow conditions inside spacecraft body.

B71-10500

**AUTOMATED PREVENTIVE MAINTENANCE PROGRAM**

CEA, E. J./SPERRY RAND CORP./ GRIEGER, T. H.

DEC. 1971

GSFC-11408

Maintenance program which is concise and inexpensive to operate adapts to almost any system that has a FORTRAN compiler. Program operates on a stored data base with an output consisting of scheduling information and various management reports.

B71-10501

# PREDICTION OF STALL CHARACTERISTICS OF STRAIGHT WING AIRCRAFT

FOX, C. H. KISIELEWSKI, E./DYNASCI. CORP./ MC VEIGH, H. A.

DEC. 1971 SEE ALSO NACA-TN-1036, NACA-TR-1090, NASA-CR-1646

LANGLEY-11013

Digital computer program considers an unswept wing with a circular or elliptical fuselage. Wing has partial or full span deflected flaps and must have an aspect ratio of 6 or greater.

B71-10508

# DESIGN AND EVALUATION OF CONVECTIVELY COOLED NOZZLES

DERDERIAN, G. DUSCHA, R. A. RORDE, J. E.

DEC. 1971

LEWIS-10894

Computer program utilizes a desired gas sidewall temperature profile as an input and calculates the coolant passage dimensions required to achieve it. Second program utilizes fixed coolant passage dimensions as an input and calculates the resulting temperature profile.

B71-10509

# EVALUATION OF ROTATING, INCOMPRESSIBLY LUBRICATED, PRESSURIZED THRUST BEARINGS

FLEMING, D. P.

DEC. 1971

LEWIS-11511

Program evaluates a series hybrid, fluid film ball bearing consisting of an orifice compensated pressurized thrust bearing in conjunction with a self-acting journal bearing. Oil viscosities corresponding to experimentally measured ball bearing outer-race temperatures were used.

B71-10532

# A STUDY OF HIGH FREQUENCY NONLINEAR COMBUSTION INSTABILITY IN BAFFLED ANNULAR LIQUID PROPELLANT ROCKET MOTORS

ABREU, A. BURSTEIN, S. Z. KUSHIDA, R. O. SCHECHTER, H.

DEC. 1971

NPO-11800

Computer program contains mathematical model which provides relationship between engine gas dynamics and combustion processes. Mathematically simulated explosions initiate gas disturbances. Design methods for damping disturbances can be studied to prevent future engine shutdown or destruction.

B71-10535

# VIBRATION CHARACTERISTICS OF RING-STIFFENED ORTHOTROPIC SHELLS OF REVOLUTION

ADELMAN, H. M. CATHERINES, D. S. DURLING, B. J.

STEEVES, E. C. WALTON, W. C., JR.

DEC. 1971

LANGLEY-10989

Computer program solves vibration modes and frequencies of thin shells of revolution having general meridional curvature and orthotropic elastic properties in order to evaluate the dynamic behavior of structures with thin shelled components.

#### Subject Index

The title of each Tech Brief is listed under several selected subject headings to provide the user with a variety of approaches in his search for specific information. The Tech Brief number, e.g. B71 10097, is located under and to the right of the title and is followed by a two digit number, e.g. 04, which designates the subject category in which the entire entry can be found.

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**ABRASION RESISTANCE**  
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**ABRASIVES**  
Improved diamond coring bits developed for dry and chip-flush drilling  
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**ABSORBENTS**  
Explosive bonded TZM-wire-reinforced C129Y columbium composites  
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Active cavity radiometer, type III - An automatic, absolute standard, highly accurate detector  
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**ABSORPTION SPECTRA**  
Miniature carbon dioxide sensor  
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**ABSORPTIVITY**  
Nonflammable organic-base paint for oxygen-rich atmospheres  
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An investigation of tandem-row, high-head pump inducers  
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High density plasma gun generates plasmas at 190 kilometers per second  
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Optimum doping achieves high quantum yields in GaAs photoemitters  
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Hydraulic actuator motion limiter ensures operator safety  
[ARC-10131] B71-10233 07

Past carry accumulator design  
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**ACOUSTIC MEASUREMENTS**  
An unconfined, large-volume hydrogen/air explosion  
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Tone-burst technique measures high-intensity sound absorption  
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**ACOUSTIC PROPERTIES**  
Multichannel intercom with simultaneous send/receive capability  
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**ACOUSTIC VELOCITY**  
Improved method for calculating pump thermodynamic suppression head  
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**ACOUSTICS**  
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Remote control radioactive-waste removal system uses modulated laser transmitter  
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## ACTIVITY (BIOLOGY)

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[M-PS-14671] B71-10034 04

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[LEWIS-11212] B71-10098 07

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Small size transformer provides high power regulation with low ripple and maximum control  
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[GSPC-10932] B71-10279 01

Improved relay chatter detector  
[NPO-10355] B71-10292 01

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[GSPC-10972] B71-10312 05

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[ARG-10413] B71-10047 05

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Energy levels and transition probability matrix elements of ruby for maser applications  
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Microwave biasing improves detector response in the infrared region  
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[NPO-11504] B71-10131 03

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[LEWIS-11280] B71-10223 02

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[KSC-13613] B71-10506 03

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[KSC-13262] B71-10067 07

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[ARC-10132] B71-10234 01  
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[MSC-13746] B71-10263 02  
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[GSFC-11248] B71-10365 01  
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[NPO-12026] B71-10293 08  
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[M-FS-20542] B71-10269 03  
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[LEWIS-11162] B71-10264 03  
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[MSC-17332] B71-10320 04  
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[LEWIS-10814] B71-10388 03  
Improved plasma accelerator  
[ARC-10109] B71-10454 03  
Laser device provides accurate reference to true  
gravitational vertical  
[ARC-10444] B71-10479 07

## CATIONS

A silver ion water sterilization system  
[MSC-15734] B71-10278 04

## CAVITATION FLOW

Ultrasonic metal etching for metallographic analysis  
[LEWIS-11230] B71-10099 04  
An investigation of tandem-row, high-head pump  
inducers  
[M-PS-21139] B71-10152 07  
Erosion of metals by multiple impacts with water  
[HQ-10591] B71-10197 04  
A low-altitude satellite interaction study  
[GSFC-11384] B71-10499 09

## CAVITIES

Active cavity radiometer, type III - An automatic,  
absolute standard, highly accurate detector  
[NPO-11504] B71-10131 03  
Optical inspection tool for interior surfaces of  
fluid lines  
[M-PS-15162] B71-10513 06

## CDC COMPUTERS

Metabolic balance analysis program  
[M-PS-21237] B71-10384 09  
Optical design and analysis program  
[GSFC-11393] B71-10456 09

## CDC 3100 COMPUTER

Ray tracing program with options for diffraction  
gratings  
[GSFC-11305] B71-10294 09

## CDC 6000 SERIES COMPUTERS

Fast Mars communication geometry program  
[LANGLEY-10658] B71-10002 09  
NASTRAN computer system level 12.1  
[GSFC-10991] B71-10285 09  
Spin vector control of a spinning space station  
[M-PS-21333] B71-10296 09  
Vibrational transfer functions for base excited  
systems  
[M-PS-21432] B71-10441 09

## CDC 6400 COMPUTER

Synthesis of dynamic systems  
[M-PS-21490] B71-10491 09  
Vibration characteristics of ring-stiffened  
orthotropic shells of revolution  
[LANGLEY-10989] B71-10535 09

## CDC 6600 COMPUTER

Computer program for predicting creep behavior of  
bodies of revolution  
[NUC-11104] B71-10037 09

FEATS - Finite element thermal stress analysis of  
plane or axisymmetric solids  
[NUC-10242] B71-10038 09

AUTOTEM - Automated geometry meshing and heat  
conduction calculation  
[NUC-10241] B71-10039 09

Monte Carlo program for the transport of neutrons  
and gamma rays  
[LEWIS-11403] B71-10490 09

Prediction of stall characteristics of straight wing  
aircraft  
[LANGLEY-11013] B71-10501 09

Vibration characteristics of ring-stiffened  
orthotropic shells of revolution  
[LANGLEY-10989] B71-10535 09

## CELESTIAL MECHANICS

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[ARC-10084] B71-10445 02

## CELLS (BIOLOGY)

Analytical methods for bacterial kinetics studies  
[LRL-10011] B71-10192 05

## CELLULOSE

The deterioration of intermediate moisture foods  
[MSC-13827] B71-10332 05  
Insolubilization process increases enzyme stability  
[ARC-10314] B71-10443 04

## CENSORED DATA (MATHEMATICS)

Statistical analysis tables for truncated or  
censored samples  
[M-PS-21024] B71-10351 03  
Table for estimating parameters of Weibull  
distribution  
[M-PS-18817] B71-10436 03

## CENTER OF GRAVITY

Accumulative weights program  
[M-PS-15066] B71-10181 09  
Rotordynamic response analysis program  
[HQ-10579] B71-10211 09  
Landing dynamics program for impact attenuating  
vehicles /LANDIT/  
[NPO-10840] B71-10472 09

## CENTRIFUGAL FORCE

Series-hybrid bearing - An approach to extending  
bearing fatigue life at high speeds  
[LEWIS-11152] B71-10173 07

## CENTRIFUGAL PUMPS

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[LEWIS-10256] B71-10100 07

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- A concept  
[NUC-10223] B71-10125 01

- Protective coating for salt-bath brazing  
[LEWIS-90255] B71-10381 08
- CERAMICS**
- Improved wax mold technique forms complex passages  
in solid structures  
[ILA-07829] B71-10063 05
- Ceramic wiring board increases packaging density of  
electronic modules  
[MSC-13497] B71-10084 01
- Methyl alcohol used as penetrant inspection medium  
for porous materials  
[NUC-10419] B71-10103 06
- Metal-to-ceramic seals - A literature survey  
[NPO-11430] B71-10116 08
- Ceramic backup ring prevents undesirable weld-metal  
buildup  
[NUC-10357] B71-10117 08
- Improved transducer for squeeze-film bearings  
[M-PS-20826] B71-10140 07
- Unique intermetallic compounds prepared by shock  
wave synthesis  
[M-PS-20861] B71-10216 04
- Granular two-phase insulation systems  
[NPO-12068] B71-10290 04
- Coatings from copolymers of tetraphenoxysilane and  
p,p(1)-biphenol  
[M-PS-14947] B71-10303 04
- Improved electron emitter  
[LEWIS-10814] B71-10388 03
- Practical method of diffusion-welding steel plate in  
air  
[LEWIS-11387] B71-10455 08
- CERMETS**
- Metal-to-ceramic seals - A literature survey  
[NPO-11430] B71-10116 08
- Unique intermetallic compounds prepared by shock  
wave synthesis  
[M-PS-20861] B71-10216 04
- Use of cermet thin film resistors with nitride  
passivated metal insulator field effect transistor  
[GSFC-10835] B71-10375 08
- CERTIFICATION**
- Qualifications and certification of nondestructive  
testing personnel  
[M-PS-20850] B71-10271 06
- CESIUM IODIDES**
- Scintillation detector for carbon-14  
[ARC-10378] B71-10144 03
- CESIUM OXIDES**
- Optimum doping achieves high quantum yields in GaAs  
photoemitters  
[M-PS-20962] B71-10357 03
- CHANNELS (DATA TRANSMISSION)**
- High-speed digital plotter  
[ARG-90001] B71-10049 02
- Multichannel intercom with simultaneous send/receive  
capability  
[M-PS-18808] B71-10228 02
- CHARCOAL**
- Estimating carbon monoxide exposure  
[MSC-17211] B71-10319 04
- CHARGED PARTICLES**
- Improved charged-particle analyzer - A concept  
[XAC-05506] B71-10283 03
- CHARTS**
- Improved method for calculating pump thermodynamic  
suppression head  
[M-PS-20852] B71-10239 07
- Compressed gas handbook  
[KSC-10662] B71-10272 03
- Pictorial display of materials and processes aids in  
fabricating complex assemblies  
[M-PS-24006] B71-10341 01
- Psychrometric chart for physiological research  
[ARC-10394] B71-10470 03
- CHECKOUT**
- Radiation view factor program  
[M-PS-21075] B71-10106 09
- FORTRAN 4 digital program changer  
[MSC-17567] B71-10448 09
- CHELATES**
- The deterioration of intermediate moisture foods  
[MSC-13827] B71-10332 05
- CHEMICAL ANALYSIS**
- Automatic amino acid analyzer  
[ARC-10215] B71-10165 04
- CHEMICAL CLEANING**
- Device prepares aluminum surfaces for welding  
[M-PS-20750] B71-10214 07
- CHEMICAL ENERGY**
- Synthesis of fluorinated organic compounds using  
oxygen difluoride  
[NPO-12061] B71-10154 04
- CHEMICAL EQUILIBRIUM**
- Insolubilization process increases enzyme stability  
[ARC-10314] B71-10443 04
- CHEMICAL INDICATORS**
- Microwave dosimeter - A concept  
[HQ-10407] B71-10075 01
- CHEMICAL MACHINING**
- Accurate pointing of tungsten welding electrodes  
[ARG-10449] B71-10048 08
- CHEMICAL PROPERTIES**
- Teardown analysis for detecting shelf-life  
degradation  
[M-PS-24017] B71-10195 04
- CHEMICAL REACTION CONTROL**
- Insolubilization process increases enzyme stability  
[ARC-10314] B71-10443 04
- CHEMICAL REACTIONS**
- Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04
- Salt stabilizer for preventing chlorine depletion  
and increasing shelf-life of potable water - A  
concept  
[MSC-17153] B71-10097 04
- A new metalation complex for organic synthesis and  
polymerization reactions  
[NPO-10313] B71-10210 04
- Instrument detects bacterial life forms  
[GSFC-10972] B71-10312 05
- Solvation agent for disulfide precipitates from  
inhibited glycol-water solutions  
[MSC-13695] B71-10331 04
- CHEMICAL REACTORS**
- Antipollution system to remove nitrogen dioxide gas  
[LEWIS-11297] B71-10393 04
- CHIPPING**
- Improved diamond coring bits developed for dry and  
chip-flush drilling  
[M-PS-21111] B71-10358 07
- CHIPS**
- Study of second breakdown in power transistors using  
infrared techniques  
[M-PS-20748] B71-10021 01
- Refrigerated cutting tools improve machining of  
superalloys  
[LANGLEY-10488] B71-10076 08
- Data sampling system for monitor and control station  
[M-PS-20948] B71-10299 02
- Use of cermet thin film resistors with nitride  
passivated metal insulator field effect transistor  
[GSFC-10835] B71-10375 08
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- Salt stabilizer for preventing chlorine depletion  
and increasing shelf-life of potable water - A  
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[MSC-17153] B71-10097 04
- Inexpensive anti-fog coating for windows  
[MSC-13530] B71-10149 04
- A silver ion water sterilization system  
[MSC-15734] B71-10278 04
- CHLORINE COMPOUNDS**
- Development of conformal coating materials  
[M-PS-21393] B71-10483 04
- CHLOROPRENE RESINS**
- Improved smoke generator for low-speed wind tunnels  
[LANGLEY-10885] B71-10337 06
- CHOKES (FUEL SYSTEMS)**
- Liquid-fuel valve with precise throttling control  
[NPO-10808] B71-10449 07
- CHOKES (RESTRICTIONS)**
- Small size transformer provides high power  
regulation with low ripple and maximum control  
[M-PS-16709] B71-10193 01
- Ultrathin gate valve for high vacuum operation  
[GSFC-11028] B71-10412 07
- CHROMATES**
- Cadmium plated steel caps seal anodized aluminum  
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[M-PS-20137] B71-10355 05
- CHROMIUM**
- Energy levels and transition probability matrix  
elements of ruby for maser applications  
[NPO-11687] B71-10308 09
- Electroplating on titanium alloy  
[M-PS-21251] B71-10338 08

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## CHROMIUM OXIDES

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[GSPC-10072] B71-10198 04

## CHRONOLOGY

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[M-PS-24020] B71-10196 06

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PUZZLE - A program for computer-aided design of  
printed circuit artwork  
[LRL-10050] B71-10122 09

Multilayered printed circuit boards inspected by  
X-ray laminography  
[M-PS-20849] B71-10226 02

Low-temperature bonding of temperature-resistant  
electronic connections  
[M-PS-20909] B71-10253 08

## CIRCUIT PROTECTION

Inexpensive system protects megawatt  
resistance-heating furnace against high-voltage  
surges  
[NUC-10239] B71-10043 01

Polarographic carbon dioxide transducer amplifier  
[MSC-13728] B71-10090 02

Digital decoder for phase-delay coded data  
[GSPC-10894] B71-10345 01

Improved circuit avoids premature power transistor  
failure  
[NPO-11365] B71-10370 02

Development of conformal coating materials  
[M-PS-21393] B71-10483 04

## CIRCUIT RELIABILITY

Active parallel redundancy for electronic  
integrator-type control circuits  
[NUC-10231] B71-10040 01

## CIRCUITS

Universal interface enables one recorder to serve  
numerous measuring instruments  
[M-PS-15134] B71-10011 01

Conductive elastomeric extensometer  
[M-PS-21049] B71-10032 01

Miniature fuel cells relieve gas pressure in sealed  
batteries  
[XGS-11370] B71-10064 02

Dual-channel circuit conditions/amplifies  
transducers' inputs and outputs  
[MSC-15712] B71-10069 01

High-reliability release mechanism  
[LEWIS-11233] B71-10080 07

Ceramic wiring board increases packaging density of  
electronic modules  
[MSC-13497] B71-10084 01

Electronic device increases threshold sensitivity  
and removes noise from FM communications receiver  
[MSC-12165] B71-10091 02

High current compensation network for dc logarithmic  
amplifiers  
[NUC-10148] B71-10128 01

High voltage lightning grounding device  
[LEWIS-11282] B71-10136 01

Saturation current spikes eliminated in saturable  
core transformers  
[ERC-10125] B71-10142 01

Electrical instrument measures position and velocity  
of shock waves  
[ARC-10356] B71-10143 03

Isolated-line commutator-amplifier  
[M-PS-20734] B71-10148 02

Design of hysteresis circuits using differential  
amplifiers  
[ARC-10070] B71-10162 01

Electronic ripple indicator  
[KSC-10162] B71-10170 01

A 20 kHz power oscillator  
[LEWIS-11319] B71-10174 01

Coarse roll-rate gain-control circuit  
[ARC-10064] B71-10204 01

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capability  
[M-PS-18808] B71-10228 02

Portable circuit-interruption indicator  
[KSC-10546] B71-10246 02

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[KSC-10661] B71-10258 02

Dynamic response of viscous compressible fluids in  
rigid tubes  
[M-PS-20542] B71-10269 03

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in lamp control circuit

[M-PS-20891] B71-10275 01

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[KSC-10385] B71-10288 02

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systems  
[MSC-13855] B71-10318 02

Ion implantation reduces radiation sensitivity of  
metal oxide silicon /MOS/ devices  
[LANGLEY-10630] B71-10334 01

Nonvolatile read/write memory element - A concept  
[GSPC-10993] B71-10346 01

Discrete-component S-band power amplifier  
[GSPC-11248] B71-10365 01

Voltage regulator dissipates minimal power and  
functions as a voltage divider  
B71-10367 01

High efficiency telemetry method  
[NPO-10388] B71-10371 02

Tolerance analysis program  
[MSC-17487] B71-10389 09

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[KSC-10589] B71-10404 02

Durability tester for FCC connectors  
[M-PS-20128] B71-10418 08

Brushless dc motor with dual windings  
[M-PS-21290] B71-10530 02

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Unique intermetallic compounds prepared by shock  
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[M-PS-20861] B71-10216 04

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[M-PS-14804] B71-10376 09

## CIRCULAR POLARIZATION

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omnidirectional-array antenna  
[GSPC-10928] B71-10033 01

Microwave dosimeter - A concept  
[HQ-10407] B71-10075 01

## CIRCULATION

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dehumidifier and oxygen generator  
[ARC-10316] B71-10231 01

## CIRCULATORS (PHASE SHIFT CIRCUITS)

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[GSPC-11050] B71-10313 01

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[LEWIS-11233] B71-10080 07

Instant acting adhesive system  
[MSC-13732] B71-10317 04

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plating  
[M-PS-20237] B71-10420 08

Folding tool for preparing FCC molded-plug  
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[M-PS-20116] B71-10422 08

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[M-PS-20118] B71-10464 08

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[NPO-11337] B71-10187 06

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[NPO-11551] B71-10244 09

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modulated laser transmitter  
[LANGLEY-10311] B71-10343 03

## CLEANING

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[NPO-11519] B71-10160 03

Practical method of diffusion-welding steel plate in  
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[LEWIS-11387] B71-10455 08

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[M-PS-20750] B71-10214 07

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[GSPC-11133] B71-10236 03

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Man-machine communication - A transparent switchboard for computers	B71-10263	02	<b>COKE</b>		
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High-temperature, long-life polyimide seals for hydraulic actuator rods	B71-10098	07	[MSC-13639]		
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## COLD WORKING

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Laser interferometry method for absolute measurement of the acceleration of gravity  
[M-PS-21225] B71-10232 03  
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[ARC-10391] B71-10265 03

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[NPO-11353] B71-10036 03  
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[ARC-10175] B71-10427 03

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[MSC-12386] B71-10068 03

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[MSC-13857] B71-10326 02

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[MSC-12305] B71-10137 05  
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[NPO-11427] B71-10191 03  
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[LEWIS-11240] B71-10369 08  
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[LEWIS-11297] B71-10393 04

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[LEWIS-11294] B71-10215 09  
A study of high frequency nonlinear combustion instability in baffled annular liquid propellant rocket motors  
[NPO-11800] B71-10532 09

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[LANGLEY-10543] B71-10126 02  
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Thermal heliotope - A passive sun-tracker  
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Fast carry accumulator design  
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On-line analysis of random vibrations  
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Scale factor gage for fiber optics inspection device  
[MSC-17361] B71-10496 07

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[ARC-10199] B71-10526 03

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[MSC-12121] B71-10081 07

Triangular-wave generator with controlled sweep  
polarity  
[ARC-10332] B71-10166 03

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[NUC-10413] B71-10102 01

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[MSC-13920] B71-10495 05

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[LEWIS-11238] B71-10251 02

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[LEWIS-11289] B71-10262 03

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Saturation current spikes eliminated in saturable  
core transformers  
[ERC-10125] B71-10142 01

Digital parallel-to-series pulse-train converter  
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Predicting vibrational failure of flexible ducting  
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Steady temperature and density distributions in a  
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[M-PS-21415] B71-10466 05
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[ARG-90033] B71-10050 08
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# F

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[LRL-10050] B71-10122 09
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- Modular construction provides large volume storage facility in minimum space  
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[NPO-12067] B71-10289 04

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- FLANGES**
- Improved source of infrared radiation for spectroscopy  
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- Liquid-hydrogen/nuclear-radiation resistant seals  
[M-FS-21364] B71-10340 03
- Insulation assembly uses cryopumping to reduce heat transfer in cryogenic liquid line  
[KSC-10518] B71-10364 03
- Air lock mechanism speeds specimen testing in high-temperature vacuum furnaces  
[LANGLEY-10841] B71-10493 07
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[M-FS-20121] B71-10415 08
- Spool for releasing and retracting flat conductor cable  
[M-FS-20234] B71-10416 08
- Seating tool for preparing molded-plug terminations on FCC  
[M-FS-20123] B71-10417 08
- Durability tester for FCC connectors  
[M-FS-20128] B71-10418 08
- Precision die-punch for trimming the conductors of flat conductor cable  
[M-FS-20142] B71-10419 08
- Fixture for multiple-FCC chemical stripping and plating  
[M-FS-20237] B71-10420 08
- Sprue cutoff tool for molded FCC plugs  
[M-FS-20236] B71-10421 08
- Folding tool for preparing FCC molded-plug terminations  
[M-FS-20116] B71-10422 08
- Multiedge splitter for FCC  
[M-FS-20112] B71-10457 08
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[M-FS-20113] B71-10458 08
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[M-FS-20114] B71-10459 08
- Cold-blade stripper for polyimide and TFE insulation on FCC  
[M-FS-20115] B71-10460 08
- Hot-blade stripper for polyester insulation on FCC  
[M-FS-20117] B71-10461 08
- Handling fixture for soldering round wires to FCC  
[M-FS-20118] B71-10464 08
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[M-FS-20119] B71-10465 08
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- FLAT PLATES**
- High density electronic packaging module with improved cooling assembly  
[MSC-13639] B71-10088 01
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[LEWIS-11228] B71-10179 01
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[NPO-10765] B71-10004 04
- Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04
- Torch kit for welding in difficult areas  
[MSC-15704] B71-10070 08
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[M-FS-16750] B71-10150 06
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[M-FS-21096] B71-10242 01
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[M-FS-20946] B71-10245 04
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[M-FS-21364] B71-10340 03
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[MSC-17562] B71-10414 09
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[M-FS-20113] B71-10458 08
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- Pressurized suits can be fabricated with adjustable dimensions  
[MSC-12398] B71-10092 05
- FLIGHT HAZARDS**
- Minimum weight meteoroid shielding determination  
[MSC-17017] B71-10447 09
- FLIGHT RULES**
- Inexpensive, large-diameter, radar tracking and calibration spheres  
[XLA-11154] B71-10190 01
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[M-FS-20857] B71-10360 02
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- Virtual-image display system for flight simulators  
[ARC-10175] B71-10427 03
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[MSC-12388] B71-10082 02
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[ARC-10154] B71-10284 09
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[GSFC-10517] B71-10322 01
- Externally programmed variable timer  
[M-FS-20776] B71-10437 04
- Digital parallel-to-series pulse-train converter  
[MSC-12417] B71-10450 01
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- Series-hybrid bearing - An approach to extending bearing fatigue life at high speeds  
[LEWIS-11152] B71-10173 07
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[MSC-12393] B71-10167 05
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- Digital computer program for analyzing chugging instabilities  
[LEWIS-11294] B71-10215 09
- FLOW CHARTS**
- FORTRAN programming - A self-taught course  
[LANGLEY-10738] B71-10052 09
- Digital-coded matrix system simplifies design and construction of flow charts  
[MSC-13539] B71-10086 09
- FLOW COEFFICIENTS**
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[M-FS-21139] B71-10152 07
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- Variable-area nozzle automatically controls fluid flow  
[LEWIS-11217] B71-10222 07
- Device measures conductivity and velocity of ionized gas streams  
[IAC-05695] B71-10235 03
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[M-FS-20642] B71-10252 03
- Wind tunnel investigations at transonic Mach numbers  
[M-FS-20895] B71-10254 06
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[LANGLEY-10885] B71-10337 06
- A low-altitude satellite interaction study  
[GSFC-11384] B71-10499 09
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[LEWIS-10939] B71-10074 06

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[LEWIS-11001] B71-10407 06
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[KSC-10662] B71-10272 03
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[LEWIS-10894] B71-10508 09
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[M-FS-21424] B71-10519 03
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- Resin additive improves performance of high-temperature hydrocarbon lubricants  
[LEWIS-11364] B71-10394 04
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[M-FS-18774] B71-10020 07
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[NUC-11000] B71-10041 03
- Pneumatic amplifier controls high pressure fluid supply  
[MSC-12121] B71-10081 07
- Laser Doppler instrument measures fluid velocity without reference beam  
[XAC-10770] B71-10120 03
- Predicting vibrational failure of flexible ducting  
[M-FS-16750] B71-10150 06
- Hydraulic actuator motion limiter ensures operator safety  
[ARC-10131] B71-10233 07
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[LEWIS-11297] B71-10393 04
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[LEWIS-10977] B71-10402 09
- Liquid-fuel valve with precise throttling control  
[NPO-10808] B71-10449 07
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[ARC-10228] B71-10468 07
- Anemometer calibrator  
[M-FS-21424] B71-10519 03
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- Wind tunnel investigations at transonic Mach numbers  
[M-FS-20895] B71-10254 06
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[LEWIS-11294] B71-10215 09
- FLUERIC**
- Wall attachment, flueric crossover "AND" gate  
[XLA-07391] B71-10178 07
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[MSC-12121] B71-10081 07
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[LEWIS-11206] B71-10058 04
- Updated, expanded, fluid properties handbook  
[M-FS-21169] B71-10078 04
- Hydrostatic liquid-bearing for precision gyro  
[M-FS-21138] B71-10207 07
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[LEWIS-11152] B71-10173 07
- Evaluation of rotating, incompressibly lubricated, pressurized thrust bearings  
[LEWIS-11511] B71-10509 09
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[MSC-13733] B71-10277 04
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[NPO-10808] B71-10449 07
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[MSC-13262] B71-10067 07
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[MSC-15685] B71-10094 06
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[NUC-10558] B71-10105 04
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[XAC-10770] B71-10120 03
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[MSC-12305] B71-10137 05
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[M-FS-21139] B71-10152 07
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[ARC-10215] B71-10165 04
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[LEWIS-11217] B71-10222 07
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[MSC-12447] B71-10316 05
- Servo-controlled decoupler eliminates oscillations in fluid flow - A concept  
[M-FS-18793] B71-10430 06
- Optical inspection tool for interior surfaces of fluid lines  
[M-FS-15162] B71-10513 06
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[LEWIS-11217] B71-10222 07
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[LEWIS-11206] B71-10058 04
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- Wall attachment, flueric crossover "AND" gate  
[XLA-07391] B71-10178 07
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- Synthesis of a new class of highly fluorinated aliphatic diisocyanates  
[M-FS-20883] B71-10300 04
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[NPO-10765] B71-10004 04
- Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04
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[NPO-12061] B71-10154 04
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[NPO-10447] B71-10291 04
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[M-FS-20486] B71-10077 04
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[ARC-10316] B71-10231 01
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[M-FS-21364] B71-10340 03
- Liquid-fuel valve with precise throttling control  
[NPO-10808] B71-10449 07
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[GSFC-10981] B71-10409 06
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[M-FS-21075] B71-10106 09  
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[GSPC-14305]	B71-10294	09	A study of high frequency nonlinear combustion instability in baffled annular liquid propellant rocket motors	[NPO-11800]	B71-10532	09
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[MSC-13475]	B71-10295	09	FOURIER SERIES			
Spin vector control of a spinning space station			High efficiency telemetry method	[NPO-10388]	B71-10371	02
[M-FS-21333]	B71-10296	09	FOURIER TRANSFORMATION			
Energy levels and transition probability matrix elements of ruby for maser applications			Tracking antenna deformation program	[GSPC-11191]	B71-10017	09
[NPO-11687]	B71-10308	09	Multi-dimensional real Fourier transform	[NPO-11648]	B71-10133	09
MAPS - a computerized management analysis and planning system			Multispectral infrared imaging interferometer	[MSC-12404]	B71-10325	02
[LEWIS-11349]	B71-10321	09	FRACTIONATION			
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[LEWIS-11347]	B71-10372	09	FRACTIONS			
Computation of group table alphanumeric display			A continued fraction generator for smooth pulse sequences	[MSC-13697]	B71-10304	01
[LEWIS-11346]	B71-10373	09	FRACTURE MECHANICS			
Dynamics of short pressure probes			New understanding of fiber composite materials	[NPO-11605]	B71-10161	04
[LEWIS-11293]	B71-10374	09	Analytical procedure for estimating reliability of randomly excited structures	[NPO-11618]	B71-10189	06
New procedure for determining minimum time orbit transfers			Fracture mechanics evaluation of Ti-6Al-4V pressure vessels	[MSC-13995]	B71-10413	09
[M-FS-14804]	B71-10376	09	FRACTURES (MATERIALS)			
Study-simulation of space station dynamics			Electroplating on titanium alloy	[M-FS-21251]	B71-10338	08
[M-FS-21227]	B71-10382	09	Simplified procedure for emission spectrochemical analysis	[LEWIS-10985]	B71-10359	04
Metabolic balance analysis program			FRAMES			
[M-FS-21237]	B71-10384	09	Simple two-speed tape transport drive	[GSPC-10981]	B71-10409	06
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[NPO-11849]	B71-10386	09	Computing incompressible laminar and turbulent boundary layer formation	[LEWIS-11190]	B71-10155	09
Tolerance analysis program			FREE MOLECULAR FLOW			
[MSC-17487]	B71-10389	09	A low-altitude satellite interaction study	[GSPC-11384]	B71-10499	09
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[NPO-11798]	B71-10390	09	Modification of physical properties of freeze-dried rice	[MSC-13540]	B71-10259	04
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[LEWIS-10788]	B71-10392	09	Development of non-sweet, flavored food cubes	[MSC-14002]	B71-10521	05
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[LEWIS-10905]	B71-10398	09	Preparation of perfluoropolyether prepolymers	[NPO-10765]	B71-10004	04
Analysis and design of a flat central finned-tube radiator			Refrigerated cutting tools improve machining of superalloys	[LANGLEY-10488]	B71-10076	08
[LEWIS-10893]	B71-10399	09	Hydrostatic liquid-bearing for precision gyro	[M-FS-21138]	B71-10207	07
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[LEWIS-10998]	B71-10400	09	Improved molecular sorbent trap for high-vacuum systems	[ARC-10056]	B71-10478	03
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[NPO-11709]	B71-10401	09	Dual-frequency feed-horn antenna	[GSPC-10820]	B71-10056	02
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[LEWIS-10977]	B71-10402	09	Improved transducer for squeeze-film bearings	[M-FS-20826]	B71-10140	07
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[MSC-13995]	B71-10413	09	A frequency division multiplex technique for transmitting commands			
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[MSC-17562]	B71-10414	09				
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[MSC-17017]	B71-10447	09				
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[MSC-17567]	B71-10448	09				
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[GSPC-11393]	B71-10456	09				
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[GSPC-11422]	B71-10462	09				
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[GSPC-11494]	B71-10463	09				
Landing dynamics program for impact attenuating vehicles /LANDIT/						
[NPO-10840]	B71-10472	09				
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[M-FS-24073]	B71-10473	09				
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[LEWIS-11403]	B71-10490	09				
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[M-FS-21490]	B71-10491	09				
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[KSC-10521] B71-10169 02  
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 [LEWIS-11319] B71-10174 01  
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 [ARC-10269] B71-10230 02  
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 Laser Doppler instrument measures fluid velocity without reference beam  
 [IAC-10770] B71-10120 03  
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 [IAC-01670] B71-10249 03  
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 [MSC-12428] B71-10276 02  
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 [GSPC-11023] B71-10444 02  
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 [M-FS-21121] B71-10486 01  
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 [MSC-12428] B71-10276 02  
**FREQUENCY DISTRIBUTION**  
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 [ARC-10259] B71-10469 01  
**FREQUENCY DIVIDERS**  
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 [M-FS-20776] B71-10437 04  
**FREQUENCY MEASUREMENT**  
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 [LEWIS-11238] B71-10251 02  
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 [MSC-17562] B71-10414 09  
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 [GSPC-11004] B71-10502 02  
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 [ARC-10341] B71-10534 03  
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 [LANGLEY-10989] B71-10535 09  
**FREQUENCY MODULATION**  
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 [MSC-12165] B71-10091 02  
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 [NPO-11132] B71-10307 02  
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 [NPO-11542] B71-10157 03  
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 [GSPC-11086] B71-10286 01  
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 [LANGLEY-10503] B71-10029 01  
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**FREQUENCY STABILITY**  
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 [MSC-13686] B71-10089 01  
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 [LEWIS-11212] B71-10098 07  
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 [LEWIS-11178] B71-10146 07  
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 [M-FS-21611] B71-10485 05  
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 [MSC-13508] B71-10522 07  
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## GASOLINE

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Modifications to a vacuum assisted filtering device to minimize contamination			<b>GRAPHS (CHARTS)</b>		
[MSC-13733]	B71-10277	04	High-speed digital plotter		
Glass tube splitting tool			[ARG-90001]	B71-10049	02
[MSC-17183]	B71-10516	07	Thin spray film thickness measuring technique		
<b>GLAZES</b>			[M-PS-20842]	B71-10062	08
Resin additive improves performance of high-temperature hydrocarbon lubricants			Updated, expanded, fluid properties handbook		
[LEWIS-11364]	B71-10394	04	[M-PS-21169]	B71-10078	04
<b>GLIDING</b>			Fiscal output data produce versatile graphic-numeric charts		
Portable lightweight bandsaw			[NUC-10394]	B71-10108	09
[M-PS-16927]	B71-10237	07	Hybrid redundancy system for improving reliability - A concept		
<b>GLUES</b>			[NPO-11546]	B71-10132	01
NASA-tricot - A lightweight radar reflective, knitted fabric			Dynamic response of viscous compressible fluids in rigid tubes		
[LANGLEY-10776]	B71-10342	04	[M-PS-20542]	B71-10269	03
<b>GLYCEROLS</b>			Improved insulating materials effective at extremely high temperatures		
Inexpensive anti-fog coating for windows			[NPO-12067]	B71-10289	04
[MSC-13530]	B71-10149	04	Flat conductor cable handbook		
The deterioration of intermediate moisture foods			[M-PS-21009]	B71-10379	01
[MSC-13827]	B71-10332	05	Equipment and procedure for determining the elastic modulus of carbon-epoxy composites		
<b>GLYCOLS</b>			[LEWIS-11116]	B71-10397	06
Solvation agent for disulfide precipitates from inhibited glycol-water solutions			Graphical method for analyzing digital computer efficiency		
[MSC-13695]	B71-10331	04	[ARC-10210]	B71-10453	09
<b>GOLD</b>			<b>GRATINGS (SPECTRA)</b>		
Method of joining metals of significantly different expansion rates			Ultraviolet interferometer		
[NPO-12076]	B71-10028	08	[HQ-10546]	B71-10026	03
<b>GOLD COATINGS</b>			Ray tracing program with options for diffraction gratings		
Parallel-gap welding for joints between copper conductors and Kovar			[GSPC-11305]	B71-10294	09
[M-PS-21224]	B71-10168	08	<b>GRAVIMETERS</b>		
Improved reversible coulometer cell			Laser interferometry method for absolute measurement of the acceleration of gravity		
[SAN-10051]	B71-10176	02	[M-PS-21225]	B71-10232	03
Low-temperature bonding of temperature-resistant electronic connections			<b>GRAVITATION</b>		
[M-PS-20909]	B71-10253	08	Laser interferometry method for absolute measurement of the acceleration of gravity		
Durable cathodes for high-power inert-gas arcs			[M-PS-21225]	B71-10232	03
[LEWIS-11162]	B71-10264	03	<b>GRAVITATIONAL CONSTANT</b>		
<b>GRADIENTS</b>			Laser device provides accurate reference to true gravitational vertical		
Thermal scale modeling			[ARC-10444]	B71-10479	07
[M-PS-21268]	B71-10432	03	<b>GRAVITATIONAL EFFECTS</b>		
<b>GRAFTING</b>			Metabolic breath analyzer		
Polymerization of perfluorobutadiene at near-ambient conditions			[M-PS-21415]	B71-10466	05
[NPO-10447]	B71-10291	04	<b>GRAVITY GRADIENT SATELLITES</b>		
<b>GRAIN BOUNDARIES</b>			Process for producing molybdenum foil and collapsible tubing		
High-temperature strength of prealloyed-powder products increased by heat/pressure treatment			[GSPC-10008]	B71-10073	08
[LEWIS-11229]	B71-10489	04	<b>GRIPFITH CRACK</b>		
<b>GRANULAR MATERIALS</b>			New understanding of fiber composite materials		
Granular two-phase insulation systems			[NPO-11605]	B71-10161	04
[NPO-12068]	B71-10290	04	<b>GRINDING</b>		
<b>GRAPHIC ARTS</b>			Ceramic backup ring prevents undesirable weld-metal buildup		
PUZZLE - A program for computer-aided design of printed circuit artwork			[NUC-10357]	B71-10117	08
[LRL-10050]	B71-10122	09	<b>GRINDING (COMMINUTION)</b>		
Psychometric chart for physiological research			A lightweight, high output soil sampler		
[ARC-10394]	B71-10470	03	[NPO-10797]	B71-10159	07
<b>GRAPHITE</b>			<b>GRINDING (MATERIAL REMOVAL)</b>		
Producing graphite with desired properties			Accurate pointing of tungsten welding electrodes		
[NUC-11001]	B71-10042	04	[ARG-10449]	B71-10048	08
Inexpensive high-temperature furnace for thermocouple calibration			<b>GRINDING MACHINES</b>		
[NUC-10372]	B71-10046	03	Minature grinder for solid specimens		
Methyl alcohol used as penetrant inspection medium for porous materials			[M-PS-20005]	B71-10059	05
[NUC-10419]	B71-10103	06	Hobel stripper for shielded and unshielded flat conductor cable		
Self-replaceable thermocouple for molten steel bath - A concept			[M-PS-20120]	B71-10060	08
[NUC-10223]	B71-10125	01	<b>GROOVES</b>		
New understanding of fiber composite materials			Chatter-free check valve - A concept		
[NPO-11605]	B71-10161	04	[MSC-13262]	B71-10067	07
Fabrication of large tungsten structures by chemical vapor deposition			Portable lightweight bandsaw		
[LEWIS-11239]	B71-10212	08	[M-PS-16927]	B71-10237	07
Promising born/graphite/resin composites			Seating tool for preparing molded-plug terminations on FCC		
[M-PS-21126]	B71-10217	04	[M-PS-20123]	B71-10417	08

- GROOVING**  
Hobel stripper for shielded and unshielded flat conductor cable  
[M-FS-20120] B71-10060 08
- GROUND EFFECT**  
Virtual-image display system for flight simulators  
[ARC-10175] B71-10427 03
- GROUND SUPPORT EQUIPMENT**  
Diagnostic capability added to digital events evaluator  
[KSC-10526] B71-10001 02
- GROUND-AIR-GROUND COMMUNICATIONS**  
Composite antenna feed system operates from VHF to X-band  
[GSFC-11046] B71-10410 02
- GROWTH**  
Analytical methods for bacterial kinetics studies  
[LRL-10011] B71-10192 05
- GUIDANCE SENSORS**  
A 7.6m /25-ft/ extreme environments simulator  
[NPO-11353] B71-10036 03
- GUIDE VANES**  
Computer program calculates transonic velocities in turbomachines  
[LEWIS-10977] B71-10402 09
- GUMS (SUBSTANCES)**  
Protective coating for salt-bath brazing  
[LEWIS-90255] B71-10381 08
- GUNN EFFECT**  
Microwave biasing improves detector response in the infrared region  
[GSFC-11050] B71-10313 01
- GUST LOADS**  
Peak structural response to nonstationary random excitations  
[NPO-11617] B71-10188 06
- GYPSUM**  
Effect of size on cracking of materials  
[NPO-11602] B71-10158 04
- GYROSCOPES**  
Systems for dead-reckoning navigation and for simulation of instrumental error - Concepts  
[M-FS-20860] B71-10072 07  
Improved transducer for squeeze-film bearings  
[M-FS-20826] B71-10140 07  
Attitude controls for VTOL aircraft  
[XAC-8972] B71-10202 05  
Hydrostatic liquid-bearing for precision gyro  
[M-FS-21138] B71-10207 07
- GIROSTABILIZERS**  
Performance evaluation system for inertial navigation equipment  
[MSC-13542] B71-10087 02
- H**
- HALL EFFECT**  
Resistivity and Hall measurements of thermoelectric materials  
[M-FS-20470] B71-10015 03
- HALL GENERATORS**  
Brushless dc motor with dual windings  
[M-FS-21290] B71-10530 02
- HAMILTONIAN FUNCTIONS**  
Method for constructing periodic orbits in nonlinear dynamic systems  
[M-FS-14654] B71-10151 09
- HAMMERS**  
High-speed digital plotter  
[ARG-90001] B71-10049 02
- HANDBOOKS**  
Updated, expanded, fluid properties handbook  
[M-FS-21169] B71-10078 04  
Instruction manuals for radiographic nondestructive testing  
[M-FS-21350] B71-10156 06  
Recommended safety guides for industrial laboratories and shops  
[SAN-10050] B71-10175 07  
Qualifications and certification of nondestructive testing personnel  
[M-FS-20850] B71-10271 06  
Compressed gas handbook  
[KSC-10662] B71-10272 03  
Flat conductor cable handbook  
[M-FS-21009] B71-10379 01
- HARDNESS**  
Computer program for predicting creep behavior of bodies of revolution  
[NUC-11104] B71-10037 09  
High-temperature, long-life polyimide seals for hydraulic actuator rods  
[LEWIS-11212] B71-10098 07  
Ion implantation reduces radiation sensitivity of metal oxide silicon /MOS/ devices  
[LANGLEY-10630] B71-10334 01
- HARDWARE**  
Digital-coded matrix system simplifies design and construction of flow charts  
[MSC-13539] B71-10086 09  
Predicting service life margins  
[M-FS-24015] B71-10194 06  
Flat conductor cable handbook  
[M-FS-21009] B71-10379 01  
Microbial burden prediction model program  
[NPO-11709] B71-10401 09  
Theory and application of feedback shift registers  
[NPO-11486] B71-10451 02  
Graphical method for analyzing digital computer efficiency  
[ARC-10210] B71-10453 09  
Tool expedites installation of BNC connectors  
[ARC-10327] B71-10480 07  
Joint preload properties of structural threaded fasteners  
[M-FS-21453] B71-10531 08
- HARMONIC ANALYSIS**  
Determination of nonlinear resistance voltage-current relationships by measuring harmonics  
[M-FS-20402] B71-10182 01
- HARMONICS**  
A frequency division multiplex technique for transmitting commands  
[KSC-10521] B71-10169 02  
Determination of nonlinear resistance voltage-current relationships by measuring harmonics  
[M-FS-20402] B71-10182 01  
Aircraft-crash-locating transmitter features design improvements  
[M-FS-16609] B71-10213 02  
A real-time statistical time-series analyzer  
[MSC-12428] B71-10276 02  
High efficiency telemetry method  
[NPO-10388] B71-10371 02  
Waveshaping electronic circuit  
[M-FS-14916] B71-10429 01  
Planet geometric center tracker  
[ARC-10084] B71-10445 02
- HARNESSES**  
Zero-g simulation system for therapeutic application  
[M-FS-14671] B71-10034 04  
Program for improved electrical harness documentation and fabrication  
[GSFC-10386] B71-10054 09  
Folding tools for flat conductor cable harnesses  
[M-FS-20121] B71-10415 08
- HASTELLOY (TRADEMARK)**  
Ultrasonics used for high-precision nondestructive inspection of brazed joints  
[NUC-10352] B71-10045 08
- HATCHES**  
Unified hatch system  
[MSC-15813] B71-10095 06
- HAZARDS**  
Improved method of using paraformaldehyde as a disinfectant  
[MSC-15887] B71-10096 05  
Inexpensive anti-fog coating for windows  
[MSC-13530] B71-10149 04  
Synthesis of fluorinated organic compounds using oxygen difluoride  
[NPO-12061] B71-10154 04  
Recommended safety guides for industrial laboratories and shops  
[SAN-10050] B71-10175 07  
Generalized safety equation - A concept  
[M-FS-20522] B71-10183 06  
Predicting service life margins  
[M-FS-24015] B71-10194 06  
Limited life item management  
[M-FS-24020] B71-10196 06  
Hydraulic actuator motion limiter ensures operator safety  
[ARC-10131] B71-10233 07  
Hot tap thermowell installation  
[MSC-12427] B71-10302 07

Estimating carbon monoxide exposure  
[MSC-17211] B71-10319 04

Laser net - A concept for monitoring wingtip  
vortices on runways  
[M-FS-20852] B71-10360 02

**HEAD (FLUID MECHANICS)**

Improved method for calculating pump thermodynamic  
suppression head  
[M-FS-20852] B71-10239 07

Analysis and design of a flat central finned-tube  
radiator  
[LEWIS-10893] B71-10399 09

**HEAD MOVEMENT**

Eye point-of-regard system  
[ARC-10360] B71-10476 05

**HEALTH**

Estimating carbon monoxide exposure  
[MSC-17211] B71-10319 04

**HEART**

Miniature implantable instrument measures and  
transmits heart function data  
[ARC-10201] B71-10163 05

**HEART DISEASES**

EKG isolator  
[M-FS-21236] B71-10124 05

**HEART RATE**

Multimode ergometer system  
[M-FS-21044] B71-10107 05

**HEAT BALANCE**

A 7.6m /25-ft/ extreme environments simulator  
[NPO-11353] B71-10036 03

**HEAT EXCHANGERS**

High-temperature pump-motor assembly  
[LEWIS-10256] B71-10100 07

Locating tube blockage that X-ray cannot detect  
[NUC-10386] B71-10129 06

**HEAT FLUX**

Oxidation-resistant silicide coating applied to  
columbium alloy screen  
[ARC-10186] B71-10229 04

Radial heat flux transformer  
[NPO-10828] B71-10311 03

**HEAT GENERATION**

AUTOTEM - Automated geometry meshing and heat  
conduction calculation  
[NUC-10241] B71-10039 09

Exothermic brazing units  
[M-FS-21435] B71-10467 08

**HEAT MEASUREMENT**

Literature review and experimental investigation of  
heat pipes  
[M-FS-21074] B71-10353 03

**HEAT OF VAPORIZATION**

Submerged gas injector expels cryogenic liquids from  
tanks  
[LEWIS-11231] B71-10219 07

Multichamber controllable heat pipe  
[ARC-10199] B71-10526 03

**HEAT PIPES**

The heat pipe - A simple, versatile, efficient heat  
transfer tool  
[NPO-11598] B71-10109 06

Radial heat flux transformer  
[NPO-10828] B71-10311 03

Literature review and experimental investigation of  
heat pipes  
[M-FS-21074] B71-10353 03

Multichamber controllable heat pipe  
[ARC-10199] B71-10526 03

**HEAT RADIATORS**

Solvation agent for disulfide precipitates from  
inhibited glycol-water solutions  
[MSC-13695] B71-10331 04

Analysis and design of a flat central finned-tube  
radiator  
[LEWIS-10893] B71-10399 09

**HEAT RESISTANT ALLOYS**

Fabrication techniques for thorium-dispersed /TD/  
nickel  
[LEWIS-11240] B71-10369 08

High-temperature strength of prealloyed-powder  
products increased by heat/pressure treatment  
[LEWIS-11229] B71-10489 04

Solid state welding of dispersion-strengthened  
nickel alloys  
[LEWIS-11388] B71-10520 08

**HEAT SHIELDING**

Producing graphite with desired properties  
[NUC-11001] B71-10042 04

**HEAT SINKS**

High density electronic packaging module with  
improved cooling assembly  
[MSC-13639] B71-10088 01

Active cavity radiometer, type III - An automatic,  
absolute standard, highly accurate detector  
[NPO-11504] B71-10131 03

Discrete-component S-band power amplifier  
[GSFC-11248] B71-10365 01

**HEAT SOURCES**

The heat pipe - A simple, versatile, efficient heat  
transfer tool  
[NPO-11598] B71-10109 06

Computer program for thermal analysis of shadow  
shields in a vacuum  
[LEWIS-11236] B71-10115 09

Flame zone of a composite propellant expanded by a  
laser source  
[LANGLEY-10660] B71-10335 03

Steady temperature and density distributions in a  
gas containing heat sources  
[LEWIS-10905] B71-10398 09

**HEAT TRANSFER**

Vacuum-jacketed rotary joints for pipelines  
[KSC-10519] B71-10018 07

High density electronic packaging module with  
improved cooling assembly  
[MSC-13639] B71-10088 01

Improved method of using paraformaldehyde as a  
disinfectant  
[MSC-15887] B71-10096 05

High-temperature pump-motor assembly  
[LEWIS-10256] B71-10100 07

Survey of heat transfer to near critical fluids  
[LEWIS-11289] B71-10262 03

Reduction of valve leakage - A concept  
[NPO-12003] B71-10315 07

Solvation agent for disulfide precipitates from  
inhibited glycol-water solutions  
[MSC-13695] B71-10331 04

Literature review and experimental investigation of  
heat pipes  
[M-FS-21074] B71-10353 03

Insulation assembly uses cryopumping to reduce heat  
transfer in cryogenic liquid line  
[KSC-10518] B71-10364 03

Steady temperature and density distributions in a  
gas containing heat sources  
[LEWIS-10905] B71-10398 09

**HEAT TRANSMISSION**

Multichamber controllable heat pipe  
[ARC-10199] B71-10526 03

**HEAT TREATMENT**

Spool for releasing and retracting flat conductor  
cable  
[M-FS-20234] B71-10416 08

High-temperature strength of prealloyed-powder  
products increased by heat/pressure treatment  
[LEWIS-11229] B71-10489 04

**HEATING**

Alloy vapor deposition using ion plating and flash  
evaporation  
[LEWIS-11262] B71-10199 08

Strain gage performance above 1033 K  
[M-FS-18831] B71-10225 04

Improved smoke generator for low-speed wind tunnels  
[LANGLEY-10885] B71-10337 06

Glass tube splitting tool  
[MSC-17183] B71-10516 07

**HEATING EQUIPMENT**

Fabrication of large tungsten structures by chemical  
vapor deposition  
[LEWIS-11239] B71-10212 08

Portable circuit-interruption indicator  
[KSC-10546] B71-10246 02

Improved electron emitter  
[LEWIS-10814] B71-10388 03

**HEIGHT**

Remote determination of sea conditions by  
electromagnetic backscatter measurement  
[M-FS-13777] B71-10027 04

**HELIUM**

Inexpensive high-temperature furnace for  
thermocouple calibration  
[NUC-10372] B71-10046 03

Updated, expanded, fluid properties handbook  
[M-FS-21169] B71-10078 04

CSM programs SM RCS propellant quantity gaging  
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## HEMISPHERICAL SHELLS

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- [MSC-17308] B71-10130 09  
Submerged gas injector expels cryogenic liquids from tanks
- [LEWIS-11231] B71-10219 07  
Laser interferometry method for absolute measurement of the acceleration of gravity
- [M-PS-21225] B71-10232 03  
Laser vibration analyzer
- [XAC-01670] B71-10249 03  
Survey of heat transfer to near critical fluids
- [LEWIS-11289] B71-10262 03  
Dynamic response of viscous compressible fluids in rigid tubes
- [M-PS-20542] B71-10269 03  
Compressed gas handbook
- [KSC-10662] B71-10272 03
- HEMISPHERICAL SHELLS**
- Inexpensive, large-diameter, radar tracking and calibration spheres
- [XLA-11154] B71-10190 01  
Modular construction provides large volume storage facility in minimum space
- [M-PS-13568] B71-10354 08
- HERMETIC SEALS**
- Ceramic wiring board increases packaging density of electronic modules
- [HSC-13497] B71-10084 01  
Hermetically sealed motion transmitter
- [MSC-17348] B71-10328 07
- HETEROCYCLIC COMPOUNDS**
- Liquid-hydrogen/nuclear-radiation resistant seals
- [M-PS-21364] B71-10340 03
- HIERARCHIES**
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- [LEWIS-11349] B71-10321 09
- HIGH ALTITUDE**
- Multilayered printed circuit boards inspected by X-ray laminography
- [M-PS-20849] B71-10226 02
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- Active cavity radiometer, type III - An automatic, absolute standard, highly accurate detector
- [NPO-11504] B71-10131 03
- HIGH FREQUENCIES**
- A system for the automatic measurement and digital display of systolic and diastolic blood pressures
- [MSC-13227] B71-10329 05  
Vibration analysis by time-average holography
- [LANGLEY-10614] B71-10333 03  
Combined high vacuum/high frequency fatigue tester
- [LEWIS-11210] B71-10405 06
- HIGH GAIN**
- Wide-angle, circularly polarized, omnidirectional-array antenna
- [GSFC-10928] B71-10033 01  
Dual-channel circuit conditions/amplifies transducers' inputs and outputs
- [MSC-15712] B71-10069 01
- HIGH POLYMERS**
- Polymer containing functional end groups is base for new polymers
- [NPO-10998] B71-10184 04
- HIGH PRESSURE**
- Pneumatic amplifier controls high pressure fluid supply
- [HSC-12121] B71-10081 07  
Compressed gas handbook
- [KSC-10662] B71-10272 03  
Coatings from copolymers of tetraphenoxysilane and p,p'(1)-biphenol
- [M-PS-14947] B71-10303 04  
Improved plasma accelerator
- [ARC-10109] B71-10454 03  
High-temperature strength of prealloyed-powder products increased by heat/pressure treatment
- [LEWIS-11229] B71-10489 04
- HIGH RESOLUTION**
- Ultraviolet interferometer
- [HQ-10546] B71-10026 03  
Improved source of infrared radiation for spectroscopy
- [M-PS-20613] B71-10031 03  
Solar cell power scanner
- [LEWIS-11280] B71-10223 02  
Multilayered printed circuit boards inspected by X-ray laminography
- [M-PS-20849] B71-10226 02
- Improved charged-particle analyzer - A concept
- [XAC-05506] B71-10283 03  
A multiple-plate, multiple-pinhole camera for X-ray gamma-ray imaging
- [M-PS-20546] B71-10439 02
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- Long-life electromechanical sine-cosine generator
- [LANGLEY-10503] B71-10029 01  
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- [MSC-13507] B71-10065 03  
Resin additive improves performance of high-temperature hydrocarbon lubricants
- [LEWIS-11364] B71-10394 04  
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- [GSFC-11384] B71-10499 09
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- Fabrication techniques for thorium-dispersed /TD/ nickel
- [LEWIS-11240] B71-10369 08
- HIGH TEMPERATURE**
- High-temperature pump-motor assembly
- [LEWIS-10256] B71-10100 07  
Improved high-temperature metal-sheathed cables
- [NUC-10413] B71-10102 01  
Improved fire-resistant coatings
- [GSFC-10072] B71-10198 04  
Low-temperature bonding of temperature-resistant electronic connections
- [M-PS-20909] B71-10253 08  
Improved brazing technique for pyrolytic graphite
- [NPO-12026] B71-10293 08  
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- [M-PS-14947] B71-10303 04  
Literature review and experimental investigation of heat pipes
- [M-PS-21074] B71-10353 03  
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- [LEWIS-11167] B71-10403 04  
Combined high vacuum/high frequency fatigue tester
- [LEWIS-11210] B71-10405 06  
High temperature autoclave vacuum seals
- [M-PS-21131] B71-10433 08  
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- [LEWIS-11325] B71-10442 04  
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- [LEWIS-11229] B71-10489 04
- HIGH TEMPERATURE ENVIRONMENTS**
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- [NUC-10372] B71-10046 03  
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- [M-PS-18831] B71-10225 04  
Improved insulating materials effective at extremely high temperatures
- [NPO-12067] B71-10289 04  
Granular two-phase insulation systems
- [NPO-12068] B71-10290 04  
Air lock mechanism speeds specimen testing in high-temperature vacuum furnaces
- [LANGLEY-10841] B71-10493 07
- HIGH TEMPERATURE FLUIDS**
- The heat pipe - A simple, versatile, efficient heat transfer tool
- [NPO-11598] B71-10109 06
- HIGH TEMPERATURE LUBRICANTS**
- Resin additive improves performance of high-temperature hydrocarbon lubricants
- [LEWIS-11364] B71-10394 04
- HIGH TEMPERATURE TESTS**
- Inexpensive system protects megawatt resistance-heating furnace against high-voltage surges
- [NUC-10239] B71-10043 01  
Opacified fibrous thermal insulation
- [LEWIS-11235] B71-10406 03  
Air lock mechanism speeds specimen testing in high-temperature vacuum furnaces
- [LANGLEY-10841] B71-10493 07  
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- [ARC-10254] B71-10498 01  
Solid state welding of dispersion-strengthened nickel alloys
- [LEWIS-11388] B71-10520 08
- HIGH VACUUM**
- A 7.6m /25-ft/ extreme environments simulator

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- Ultrathin gate valve for high vacuum operation [GSFC-11028] B71-10412 07
- Improved molecular sorbent trap for high-vacuum systems [ARC-10056] B71-10478 03
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- High voltage lightning grounding device [LEWIS-11282] B71-10136 01
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- HISTOGRAMS**
- Tolerance analysis program [MSC-17487] B71-10389 09
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 NASA-tricot - A lightweight radar reflective,  
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 [LANGLEY-10776] B71-10342 04
- MINERAL DEPOSITS**  
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 [M-PS-21111] B71-10358 07
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 [M-PS-21237] B71-10384 09
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 [M-PS-21161] B71-10209 04
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 [NPO-11353] B71-10036 03  
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 [MSC-13506] B71-10085 03  
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 [ARC-10194] B71-10112 03  
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 [ARC-10392] B71-10119 02  
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 of the acceleration of gravity  
 [M-PS-21225] B71-10232 03

- Laser vibration analyzer  
[IAC-01670] B71-10249 03
- Optical probing of supersonic flows with statistical correlation  
[M-PS-20642] B71-10252 03
- Variable ratio beam splitter for laser applications  
[ARC-10391] B71-10265 03
- Laser device provides accurate reference to true gravitational vertical  
[ARC-10444] B71-10479 07
- Optical inspection tool for interior surfaces of fluid lines  
[M-PS-15162] B71-10513 06
- Multifrequency laser beams for holographic contouring  
[ARC-10341] B71-10534 03
- MISALIGNMENT**
- Systems for dead-reckoning navigation and for simulation of instrumental error - Concepts  
[M-PS-20860] B71-10072 07
- Silicon contact for area reduction of integrated circuits  
[M-PS-20688] B71-10368 01
- MODAL RESPONSE**
- Tracking antenna deformation program  
[GSFC-11191] B71-10017 09
- Frame modal analysis  
[MSC-17562] B71-10414 09
- Vibrational transfer functions for base excited systems  
[M-PS-21432] B71-10441 09
- Vibration characteristics of ring-stiffened orthotropic shells of revolution  
[LANGLEY-10989] B71-10535 09
- MODELS**
- Thermal and structural modeling of superinsulation  
[M-PS-20324] B71-10019 02
- Technique for experimental determination of radiation interchange factors in solar wavelengths  
[MSC-13476] B71-10066 03
- Hybrid redundancy system for improving reliability - A concept  
[NPO-11546] B71-10132 01
- Information quality-control model  
[NPO-11431] B71-10281 06
- Determination of radiation interchange factors  
[MSC-13475] B71-10295 09
- Accelerated battery-life testing - A concept  
[GSFC-11085] B71-10348 06
- MODES**
- Improved transducer for squeeze-film bearings  
[M-PS-20826] B71-10140 07
- Coarse roll-rate gain-control circuit  
[ARC-10064] B71-10204 01
- MODES (STANDING WAVES)**
- Vibration detection using lasers  
[ARC-10389] B71-10145 03
- Vibration testing and analysis using holography  
[M-PS-21050] B71-10352 03
- MODULATION**
- New filter technique improves home television reception  
[MSC-13729] B71-10141 02
- Laser vibration analyzer  
[IAC-01670] B71-10249 03
- Waveshaping electronic circuit  
[M-PS-14916] B71-10429 01
- Planet geometric center tracker  
[ARC-10084] B71-10445 02
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- Remote control radioactive-waste removal system uses modulated laser transmitter  
[LANGLEY-10311] B71-10343 03
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[ARC-10025] B71-10497 01
- Statistical measurements of the zero-crossing time of a noisy sine wave  
[GSFC-11004] B71-10502 02
- MODULES**
- Multimode ergometer system  
[M-PS-21044] B71-10107 05
- Water electrolysis module  
[ARC-10246] B71-10203 03
- Stored program concept for analog computers  
[M-PS-20874] B71-10240 09
- Data sampling system for monitor and control station  
[M-PS-20948] B71-10299 02
- Instrument detects bacterial life forms  
[GSFC-10972] B71-10312 05
- Modular construction provides large volume storage facility in minimum space  
[M-PS-13568] B71-10354 08
- MODULUS OF ELASTICITY**
- Promising born/graphite/resin composites  
[M-PS-21126] B71-10217 04
- Equipment and procedure for determining the elastic modulus of carbon-epoxy composites  
[LEWIS-11116] B71-10397 06
- MOISTURE**
- Improved high-temperature metal-sheathed cables  
[NUC-10413] B71-10102 01
- Psychrometric chart for physiological research  
[ARC-10394] B71-10470 03
- MOISTURE CONTENT**
- The deterioration of intermediate moisture foods  
[MSC-13827] B71-10332 05
- MOLDING MATERIALS**
- Improved wax mold technique forms complex passages in solid structures  
[XLA-07829] B71-10063 05
- MOLDS**
- Low-cost quasi-parabolic antenna  
[LEWIS-11291] B71-10121 01
- Inexpensive, large-diameter, radar tracking and calibration spheres  
[XLA-11154] B71-10190 01
- Strong, easy-to-mold, spiral buttress thread  
[LANGLEY-10755] B71-10336 08
- New materials for fireplace logs  
[M-PS-21363] B71-10339 04
- Sprue cutoff tool for molded FCC plugs  
[M-PS-20236] B71-10421 08
- Folding tool for preparing FCC molded-plug terminations  
[M-PS-20116] B71-10422 08
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- Improved molecular sorbent trap for high-vacuum systems  
[ARC-10056] B71-10478 03
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[GSFC-11384] B71-10499 09
- MOLECULAR WEIGHT**
- Rapid analytical determination of glutaraldehyde concentrations  
[ARG-10413] B71-10047 05
- Polymer containing functional end groups is base for new polymers  
[NPO-10998] B71-10184 04
- Statistical characterization of phenolic-novolac structures  
[ARC-10393] B71-10255 04
- Polymerization of perfluorobutadiene at near-ambient conditions  
[NPO-10447] B71-10291 04
- Coatings from copolymers of tetraphenoxysilane and p,p'(1)-biphenol  
[M-PS-14947] B71-10303 04
- Thermally stable polyimides from solutions of monomeric reactants  
[LEWIS-11325] B71-10442 04
- MOLECULES**
- Polymer containing functional end groups is base for new polymers  
[NPO-10998] B71-10184 04
- MOLYBDENUM**
- Improved source of infrared radiation for spectroscopy  
[M-PS-20613] B71-10031 03
- Inexpensive high-temperature furnace for thermocouple calibration  
[NUC-10372] B71-10046 03
- Process for producing molybdenum foil and collapsible tubing  
[GSFC-10008] B71-10073 08
- High-temperature, long-life polyimide seals for hydraulic actuator rods  
[LEWIS-11212] B71-10098 07
- Improved insulating materials effective at extremely high temperatures  
[NPO-12067] B71-10289 04
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- Erosion of metals by multiple impacts with water  
[HQ-10591] B71-10197 04
- MOLYBDENUM DISULFIDES**
- Resistivity and Hall measurements of thermoelectric materials  
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## **MONENTS**

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Standardized Pearson type 3 density function area tables  
[M-PS-20541] B71-10205 02  
A real-time statistical time-series analyzer  
[MSC-12428] B71-10276 02

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[M-PS-15066] B71-10181 09  
Rotordynamic response analysis program  
[HQ-10579] B71-10211 09

## **MOMENTUM**

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[HSC-12305] B71-10137 05

## **MOMENTUM TRANSDUCER**

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[ARC-10337] B71-10525 08

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[KSC-10526] B71-10001 02  
Conductive elastomeric extensometer  
[M-PS-21049] B71-10032 01  
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[HSC-12386] B71-10068 03  
Self-replaceable thermocouple for molten steel bath - A concept  
[NUC-10223] B71-10125 01  
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[NUC-10148] B71-10128 01  
Automatic cross-sectioning and monitoring system locates defects in electronic devices  
[GSFC-11221] B71-10221 01  
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[KSC-10385] B71-10288 02  
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[M-PS-20948] B71-10299 02  
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[ARC-10175] B71-10427 03  
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[ARC-10391] B71-10265 03

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[NPO-12061] B71-10154 04  
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[NPO-10998] B71-10184 04  
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[ARC-10393] B71-10255 04  
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[NPO-10447] B71-10291 04  
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[NPO-11617] B71-10188 06  
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## **MOORING**

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[MSC-12393] B71-10167 05

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[M-PS-21050] B71-10352 03

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[GSFC-10895] B71-10220 02  
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[NPO-10355] B71-10292 01  
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[ARC-10136] B71-10426 01  
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[HSC-13542] B71-10087 02

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[M-PS-21224] B71-10168 08

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[GSPC-11163] B71-10256 08

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[ARC-10362] B71-10477 05

**NICKEL COATINGS**  
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columbium alloy screen  
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[M-PS-18711] B71-10012 07

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[M-PS-20971] B71-10350 03

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[ARG-10449] B71-10048 08

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[M-PS-21169] B71-10078 04

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[MSC-13543] B71-10330 05
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[NPO-11688] B71-10362 04
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- Ion implantation reduces radiation sensitivity of metal oxide silicon /MOS/ devices  
[LANGLEY-10630] B71-10334 01
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[M-PS-21393] B71-10483 04
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[LANGLEY-10614] B71-10333 03
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[MSC-13729] B71-10141 02
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[M-PS-20734] B71-10148 02
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[KSC-10521] B71-10169 02
- Self-synchronizing, bi-orthogonal coded PCM telemetry system  
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[LANGLEY-10614] B71-10333 03
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[ARC-10288] B71-10528 06
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[M-PS-20748] B71-10021 01
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- Methyl alcohol used as penetrant inspection medium for porous materials  
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[M-PS-21350] B71-10156 06
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[NPO-11542] B71-10157 03
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[M-PS-20850] B71-10271 06
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[MSC-12404] B71-10325 02
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[GSFC-11085] B71-10348 06
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[M-PS-20723] B71-10438 01
- Precision, triple-parameter, nondestructive-test system for in-process microwelding  
[ARC-10402] B71-10452 01
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[M-PS-20113] B71-10458 08
- Air lock mechanism speeds specimen testing in high-temperature vacuum furnaces  
[LANGLEY-10841] B71-10493 07
- Nondestructive testing of bond integrity in foam insulation/aluminum composites  
[M-PS-20786] B71-10507 06
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[MSC-12447] B71-10316 05  
Cold-blade stripper for polyimide and TPE insulation on FCC  
[M-FS-20115] B71-10460 08
- PLATFORMS**  
Fluid slip ring transfers coolant to rotating equipment  
[MSC-13451] B71-10083 07
- PLATING**  
Alloy vapor deposition using ion plating and flash evaporation  
[LEWIS-11262] B71-10199 08  
Low-temperature bonding of temperature-resistant electronic connections  
[M-FS-20909] B71-10253 08  
Plating by glass-bead peening  
[GSPC-11163] B71-10256 08  
Folding tool for preparing FCC molded-plug terminations  
[M-FS-20116] B71-10422 08
- PLATINUM**  
Submersed sensing electrode used in fuel-cell type hydrogen detector  
[M-FS-14655] B71-10071 01  
Active cavity radiometer, type III - An automatic, absolute standard, highly accurate detector  
[NPO-11504] B71-10131 03  
Improved reversible coulometer cell  
[SAN-10051] B71-10176 02  
Inertia diaphragm pressure transducer  
[XAC-2981] B71-10200 05  
Sensitive gaseous hydrogen detection system  
[M-FS-21161] B71-10209 04  
Simplified procedure for emission spectrochemical analysis  
[LEWIS-10985] B71-10359 04
- PLATINUM BLACK**  
Electrolysis cell functions as water vapor dehumidifier and oxygen generator  
[ARC-10316] B71-10231 01
- PLAYBACKS**  
Portable low-frequency vibration measuring and recording system  
[LANGLEY-10543] B71-10126 02
- PLETHYSMOGRAPHY**  
Conductive elastomeric extensometer  
[M-FS-21049] B71-10032 01
- PLOTTERS**  
NASTRAN computer system level 12.1  
[GSPC-10991] B71-10285 09
- PLOTTING**  
AUTOTEM - Automated geometry meshing and heat conduction calculation  
[NUC-10241] B71-10039 09  
High-speed digital plotter  
[ARG-90001] B71-10049 02  
Fiscal output data produce versatile graphic-numeric charts  
[NUC-10394] B71-10108 09  
Energy levels and transition probability matrix elements of ruby for maser applications  
[NPO-11687] B71-10308 09
- PLUGS**  
Liquid-fuel valve with precise throttling control  
[NPO-10808] B71-10449 07
- PLUMES**  
Exhaust cloud rise and diffusion in the atmosphere  
[M-FS-21119] B71-10111 03
- PLUNGERS**  
Unified hatch system  
[MSC-15813] B71-10095 06  
Automatic amino acid analyzer  
[ARC-10215] B71-10165 04  
Reduction of valve leakage - A concept  
[NPO-12003] B71-10315 07  
Proportional pulsed pilot valve  
[ARC-10228] B71-10468 07
- PLUTONIUM 238**  
Scintillation detector for carbon-14  
[ARC-10378] B71-10144 03
- PNEUMATIC CONTROL**  
Pneumatic amplifier controls high pressure fluid supply  
[MSC-12121] B71-10081 07  
Remote coupling of air lines  
[NUC-10225] B71-10101 07  
Automatic amino acid analyzer  
[ARC-10215] B71-10165 04  
Dynamic response of viscous compressible fluids in rigid tubes  
[M-FS-20542] B71-10269 03  
Multichamber controllable heat pipe  
[ARC-10199] B71-10526 03
- PNEUMATIC EQUIPMENT**  
Pneumatic amplifier controls high pressure fluid supply  
[MSC-12121] B71-10081 07  
Gas chromatograph sample-transfer valve  
[ARC-10427] B71-10474 04  
Pulse width-pulse rate modulator  
[ARC-10025] B71-10497 01
- POINTS**  
Multilayered printed circuit boards inspected by X-ray laminography  
[M-FS-20849] B71-10226 02
- POLARITY**  
Universal interface enables one recorder to serve numerous measuring instruments  
[M-FS-15134] B71-10011 01  
Saturation current spikes eliminated in saturable core transformers  
[ERC-10125] B71-10142 01
- POLARIZATION (CHARGE SEPARATION)**  
Dual-frequency feed-horn antenna  
[GSPC-10820] B71-10056 02
- POLARIZATION (WAVES)**  
Remote determination of sea conditions by electromagnetic backscatter measurement  
[M-FS-13777] B71-10027 04  
Improving laser beam coherence - A concept  
[ARC-10417] B71-10527 03
- POLARIZERS**  
Laser interferometry method for absolute measurement of the acceleration of gravity  
[M-FS-21225] B71-10232 03  
Variable ratio beam splitter for laser applications  
[ARC-10391] B71-10265 03  
Improving laser beam coherence - A concept  
[ARC-10417] B71-10527 03
- POLAROGRAPHY**  
Polarographic carbon dioxide transducer amplifier  
[MSC-13728] B71-10090 02
- POLICE**  
Tone-activated, remote, alert communication system  
[NPO-11132] B71-10307 02
- POLICIES**  
Program audit, A management tool  
[KSC-10557] B71-10380 01
- POLLUTION**  
Rigid open-cell polyurethane foam for cryogenic insulation  
[LEWIS-11220] B71-10079 04  
Data sampling system for monitor and control station  
[M-FS-20948] B71-10299 02
- POLYAMIDE RESINS**  
Improved epoxy resin for constructing cryogenic filament-wound pressure vessels  
[LEWIS-11261] B71-10261 04
- POLYBENZIMIDAZOLE**  
Liquid-hydrogen/nuclear-radiation resistant seals  
[M-FS-21364] B71-10340 03
- POLYBUTADIENE**  
Synthesis of fluorinated organic compounds using oxygen difluoride  
[NPO-12061] B71-10154 04  
Polymer containing functional end groups is base for new polymers  
[NPO-10998] B71-10184 04
- POLYCRYSTALS**  
Preparation of homogeneous vitreous materials for electronic and optical devices  
[HQ-10670] B71-10172 04  
Shielding method for polycrystalline and epitaxy growths  
[M-FS-20162] B71-10434 04
- POLYESTER RESINS**  
Technique for the integral casting of pressure instrumentation in wind-tunnel models  
[LANGLEY-10812] B71-10247 08

## POLYESTERS

- Rigid open-cell polyurethane foam for cryogenic insulation  
[LEWIS-11220] B71-10079 04  
Dropouts in magnetic tape recording and reproduction  
[NPO-11519] B71-10160 03  
Fixture for multiple-FCC chemical stripping and plating  
[M-PS-20237] B71-10420 08  
Hot-blade stripper for polyester insulation on FCC  
[M-PS-20117] B71-10461 08

## POLYETHYLENES

- Ultra thin gage plastic film  
[LEWIS-11276] B71-10135 08

## POLYIMIDES

- High-temperature, long-life polyimide seals for hydraulic actuator rods  
[LEWIS-11212] B71-10098 07  
Investigation to identify paint coatings resistive to microorganism growth  
[M-PS-20458] B71-10310 04  
Liquid-hydrogen/nuclear-radiation resistant seals  
[M-PS-21364] B71-10340 03  
Thermally stable polyimides from solutions of monomeric reactants  
[LEWIS-11325] B71-10442 04  
Cold-blade stripper for polyimide and TFE insulation on FCC  
[M-PS-20115] B71-10460 08

## POLYMERIC FILMS

- Ultra thin gage plastic film  
[LEWIS-11276] B71-10135 08  
High temperature autoclave vacuum seals  
[M-PS-21131] B71-10433 08  
Insolubilization process increases enzyme stability  
[ARC-10314] B71-10443 04  
Development of conformal coating materials  
[M-PS-21393] B71-10483 04

## POLYMERIZATION

- Improved high-temperature metal-sheathed cables  
[NUC-10413] B71-10102 01  
Polymer containing functional end groups is base for new polymers  
[NPO-10398] B71-10184 04  
A new metalation complex for organic synthesis and polymerization reactions  
[NPO-10313] B71-10210 04  
Statistical characterization of phenolic-novolac structures  
[ARC-10393] B71-10255 04  
Polymerization of perfluorobutadiene at near-ambient conditions  
[NPO-10447] B71-10291 04  
Coatings from copolymers of tetraphenoxysilane and p,p'(1)-biphenol  
[M-PS-14947] B71-10303 04  
Thermally stable polyimides from solutions of monomeric reactants  
[LEWIS-11325] B71-10442 04  
Insolubilization process increases enzyme stability  
[ARC-10314] B71-10443 04  
New primers for adhesive bonding of aluminum alloys  
[M-PS-21387] B71-10488 04

## POLYMERS

- Preparation of perfluoropolyether prepolymers  
[NPO-10765] B71-10004 04  
Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04  
Improved method of using paraformaldehyde as a disinfectant  
[MSC-15887] B71-10096 05  
Effects of the thermal sterilization procedure on polymeric products  
[NPO-11688] B71-10362 04

## POLYNOMIALS

- A topological approach to computer-aided sensitivity analysis  
[ARC-10214] B71-10164 02  
Hybrid computer techniques for solving partial differential equations  
[M-PS-21386] B71-10424 09

## POLYPROPYLENE

- Welded polypropylene liners for large descaling tanks  
[M-PS-18711] B71-10012 07  
Water electrolysis module  
[ARC-10246] B71-10203 03

## POLYSTYRENE

- Microwave cryogenic thermal-noise standards

- [NPO-11424] B71-10139 03  
Inexpensive, large-diameter, radar tracking and calibration spheres  
[ILA-11154] B71-10190 01  
Improved vacuum probe collects surface-contamination samples  
[LANGLEY-10623] B71-10475 05  
**POLYTETRAFLUOROETHYLENE**  
Preparation of perfluoropolyether prepolymers  
[NPO-10765] B71-10004 04  
Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04  
Synthesis of fluorinated organic compounds using oxygen difluoride  
[NPO-12061] B71-10154 04  
Plating by glass-bead peening  
[GSPC-11163] B71-10256 08  
Cold-blade stripper for polyimide and TFE insulation on FCC  
[M-PS-20115] B71-10460 08  
**POLYURETHANE FOAM**  
Rigid open-cell polyurethane foam for cryogenic insulation  
[LEWIS-11220] B71-10079 04  
Portable lightweight bandsaw  
[M-PS-16927] B71-10237 07  
Nondestructive testing of bond integrity in foam insulation/aluminum composites  
[M-PS-20786] B71-10507 06  
**POLYURETHANE RESINS**  
Preparation of perfluoropolyether prepolymers  
[NPO-10765] B71-10004 04  
Preparation of highly fluorinated polyurethanes  
[NPO-10767] B71-10005 04  
Device prepares aluminum surfaces for welding  
[M-PS-20750] B71-10214 07  
Synthesis of a new class of highly fluorinated aliphatic diisocyanates  
[M-PS-20883] B71-10300 04  
Investigation to identify paint coatings resistive to microorganism growth  
[M-PS-20458] B71-10310 04  
**POLYVINYL CHLORIDE**  
Welded polypropylene liners for large descaling tanks  
[M-PS-18711] B71-10012 07  
**POROSITY**  
Rigid open-cell polyurethane foam for cryogenic insulation  
[LEWIS-11220] B71-10079 04  
Interpretation of aluminum-alloy weld radiography  
[M-PS-20943] B71-10206 08  
Device prepares aluminum surfaces for welding  
[M-PS-20750] B71-10214 07  
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[M-PS-20946] B71-10245 04  
Modification of physical properties of freeze-dried rice  
[MSC-13540] B71-10259 04  
Modifications to a vacuum assisted filtering device to minimize contamination  
[MSC-13733] B71-10277 04  
**POROUS MATERIALS**  
Methyl alcohol used as penetrant inspection medium for porous materials  
[NUC-10419] B71-10103 06  
**POROUS PLATES**  
Submerged gas injector expels cryogenic liquids from tanks  
[LEWIS-11231] B71-10219 07  
**PORTABLE EQUIPMENT**  
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[M-PS-20120] B71-10060 08  
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[M-PS-20842] B71-10062 08  
Portable lightweight bandsaw  
[M-PS-16927] B71-10237 07  
Portable circuit-interruption indicator  
[KSC-10546] B71-10246 02  
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[M-PS-20114] B71-10459 08  
Cold-blade stripper for polyimide and TFE insulation on FCC  
[M-PS-20115] B71-10460 08  
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[ILA-07391] B71-10178 07

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Gas chromatograph sample-transfer valve [ARC-10427]	B71-10474	04	Low-frequency triangular wave generator [ARC-10259]	B71-10469	01
Distribution and metering system for soil samples [ARC-10429]	B71-10481	07	<b>POTTING COMPOUNDS</b> Handling fixture for soldering round wires to FCC [M-FS-20118]	B71-10464	08
<b>POSITION (LOCATION)</b> Electrical instrument measures position and velocity of shock waves [ARC-10356]	B71-10143	03	<b>POWDER (PARTICLES)</b> Improved method of using paraformaldehyde as a disinfectant [MSC-15887]	B71-10096	05
Eye point-of-regard system [ARC-10360]	B71-10476	05	<b>POWDER METALLURGY</b> Methyl alcohol used as penetrant inspection medium for porous materials [NUC-10419]	B71-10103	06
<b>POSITION INDICATORS</b> Modified bubble level senses pitch and roll angles over wide range [MSC-13506]	B71-10085	03	High-temperature strength of prealloyed-powder products increased by heat/pressure treatment [LEWIS-11229]	B71-10489	04
<b>POSITIONING</b> Seating tool for preparing molded-plug terminations on FCC [M-FS-20123]	B71-10417	08	<b>POWDERED ALUMINUM</b> Opacified fibrous thermal insulation [LEWIS-11235]	B71-10406	03
Multiedge slitter for FCC [M-FS-20112]	B71-10457	08	<b>POWER AMPLIFIERS</b> Electronic ripple indicator [KSC-10162]	B71-10170	01
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Oscillator with wide dynamic tuning range [GSPC-11086]	B71-10286	01	Voltage regulator dissipates minimal power and functions as a voltage divider [B71-10367]	B71-10367	01
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<b>POTABLE WATER</b> Salt stabilizer for preventing chlorine depletion and increasing shelf-life of potable water - A concept [MSC-17153]	B71-10097	04	<b>POWER REACTORS</b> Saturable-reactor motor starter reduces line voltage fluctuations [M-FS-18921]	B71-10013	01
A silver ion water sterilization system [MSC-15734]	B71-10278	04	Computer program optimizes design of nuclear radiation shields [LEWIS-10998]	B71-10400	09
<b>POTASSIUM BROMIDES</b> Improved source of infrared radiation for spectroscopy [M-FS-20613]	B71-10031	03	<b>PRAWDTL NUMBER</b> Computer program for predicting creep behavior of bodies of revolution [NUC-11104]	B71-10037	09
<b>POTASSIUM COMPOUNDS</b> Electroplating on titanium alloy [M-FS-21251]	B71-10338	08	<b>PREAMPLIFIERS</b> Performance evaluation system for inertial navigation equipment [MSC-13542]	B71-10087	02
<b>POTASSIUM HYDROXIDES</b> Water electrolysis module [ARC-10246]	B71-10203	03	Multichannel intercom with simultaneous send/receive capability [M-FS-18808]	B71-10228	02
<b>POTASSIUM SILICATES</b> Nonflammable organic-base paint for oxygen-rich atmospheres [M-FS-20486]	B71-10077	04	A system for the automatic measurement and digital display of systolic and diastolic blood pressures [MSC-13227]	B71-10329	05
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Improved fire-resistant coatings [GSPC-10072]	B71-10198	04	Instrument accurately measures stress loads in threaded bolts [M-FS-21121]	B71-10486	01
<b>POTENTIAL FLOW</b> Fracture mechanics evaluation of Ti-6Al-4V pressure vessels [MSC-13995]	B71-10413	09	<b>PRECIPITATION (CHEMISTRY)</b> Solvation agent for disulfide precipitates from inhibited glycol-water solutions [MSC-13695]	B71-10331	04
<b>POTENTIOMETERS (INSTRUMENTS)</b> Automatic reference level control for an antenna pattern recording system [M-FS-20257]	B71-10014	01	<b>PRECIPITATION HARDENING</b> Metal alloy resistivity measurements at very low temperatures [NUC-10557]	B71-10104	04
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<b>POTENTIOMETERS (RESISTORS)</b> Triangular-wave generator with controlled sweep polarity [ARC-10332]	B71-10166	03			
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## PREDICTIONS

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[LEWIS-11231] B71-10219 07

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Fracture mechanics evaluation of T1-6A1-4V pressure vessels  
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**SPACECRAFT CABINS**  
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[MSC-12419] B71-10301 07

**SPACECRAFT CONTAMINATION**  
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[NPO-11709] B71-10401 09

**SPACECRAFT CONTROL**  
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**SPACECRAFT DOCKING**  
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[M-FS-21333] B71-10296 09

**SPACECRAFT ENVIRONMENTS**  
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[NPO-11849] B71-10386 09  
A low-altitude satellite interaction study  
[GSFC-11384] B71-10499 09

**SPACECRAFT GUIDANCE**  
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**SPACECRAFT MODELS**  
Criteria for vibration testing  
[GSFC-10737] B71-10266 06

**SPACECRAFT POWER SUPPLIES**  
Battery simulation program  
[NPO-11580] B71-10250 09

**SPACECRAFT SHIELDING**  
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[LEWIS-11220] B71-10079 04  
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Precision die-punch for trimming the conductors of  
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Folding tool for preparing FCC molded-plug  
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[M-FS-20116] B71-10422 08  
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[MSC-12432] B71-10511 07

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[LRL-10050] B71-10122 09  
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[M-FS-20849] B71-10226 02

**SPALLING**  
Resin additive improves performance of  
high-temperature hydrocarbon lubricants  
[LEWIS-11364] B71-10394 04

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A concept  
[NPO-11546] B71-10132 01  
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[M-FS-24020] B71-10196 06

**SPARK GAPS**  
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[MSC-12404] B71-10325 02

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[NPO-11542] B71-10157 03  
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[illegible]

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